The RHODE ISLAND MEDICAL JOURNAL

Editorial and Business Office: 106 Francis Street, Providence, R. I.

Editor-in-Chief: PETER PINEO CHASE, M.D.

Managing Editor: JOHN E. FARRELL

Owned and Published Monthly by

THE RHODE ISLAND MEDICAL SOCIETY

Entered as second-class matter at the post office at Providence, Rhode Island

Single copies, 25 cents . . . Subscription, $2.00 per year.

Volume XXXVI, No. 11 November, 1953

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The RHODE ISLAND MEDICAL JOURNAL

VOL. XXXVI NOVEMBER, 1953 NO. 11

NEWER ASPECTS OF SODIUM METABOLISM: CORRELATION OF THE CLINICAL WITH THE CHEMICAL PICTURE*

JOHN H. BLAND, M.D.

The Author. *John H. Bland, M.D., of Burlington, Vermont. Assistant Professor of Medicine, University of Vermont College of Medicine.*

ABNORMALITIES in the volume of body fluids and the concentration of electrolytes in body water have universal importance in the practice of medicine. A number of poorly understood and unrecognized clinical syndromes have become clearly delineated through knowledge of the behavior of body fluids and electrolytes in disease. Good correlations have been forthcoming between the clinical picture and the metabolic chemical changes so that clinical diagnoses or at least strong clinical suspicions, are possible without detailed laboratory studies.

All physicians meet these problems. In surgery, the challenge of operative technique, anesthesia, pain control or intrument design are not nearly so urgent as they were a few years ago. Certainly the frontiers of surgery today, lie in metabolic fields; the maintenance of proper fluid and electrolyte balance and the understanding of the metabolic response to trauma are primary concerns of the surgeon. The general practitioner or internist in treating congestive heart failure knows that all the symptomatology is produced by the retention of water and electrolyte. Relief of symptoms depends on his ability to promote excretion of the retained fluid and electrolyte. The symptoms of renal decompensation are, in the main, a consequence of faulty renal handling of fluid and electrolyte. Acute and chronic pulmonary diseases produce metabolic changes in body water and electrolyte plus alterations in acid-base balance that in turn result in clinical symptoms and signs to be interpreted for guidance in therapy.

Almost all medical or surgical diseases of very serious consequence are associated with metabolic changes influencing body water and electrolyte in varying magnitude. Sometimes such changes are better left alone but occasionally treatment is of extreme urgency and of life saving importance. We need most to know how to interpret certain metabolic changes in response to disease or trauma in order that we don't vigorously treat a healthy, normal, beneficial metabolic response and convert it to an abnormal response. We need also to know when and how to interfere when abnormal electrolyte and fluid losses or gains jeopardize the patient's recovery.

To accomplish these ends, one must understand the normal metabolic behavior of body water and electrolyte and thus be able to properly interpret abnormalities. Treatment is based on this interpretation.

Perhaps first, a brief summary of some of the physiological and biochemical fundamentals of fluid and electrolyte behavior would provide a helpful background. Secondly, I'd like to touch on some of the problems of interpretation of serum concentrations of electrolytes, particularly sodium, and lastly to consider, the pathologic physiology, diagnosis and treatment of sodium depletion.

The body fluids as a whole may be divided into two phases or compartments, the intra-cellular compartment and the extracellular compartment. Figure 1[1] illustrates the division of compartments and is prepared in order that the areas are proportional to the actual quantity of the ions in each compartment. The total body water in this instance is 33 liters and this is subdivided into a plasma volume of 2.6 liters, and interstitial fluid volume of 7.0 liters and an intra-cellular fluid volume of 23.4 liters. The metabolic processes of life take place in the intra-cellular compartment and the extra-cellular compartment constitutes, as Claude Bernard pointed out, the stable, internal environment of the cells. Extra-cellular and intra-cellular fluid differ radically in their ionic composition. Plasma is very similar in composition to interstitial or extra-vascular extra-cellular fluid. The principal electrolytes of the intra-cellular fluid are potassium, magnesium, phosphate and protein. Those of the extra-cellular fluid are sodium, chloride and bicarbonate. The distribution of electrolytes between these two phases of body fluids seems to be main-

*Presented at the 142nd Annual Meeting of the Rhode Island Medical Society, at Providence, R. I., May 7, 1953.

[1]Adapted by Dr. E. A. H. Sims.

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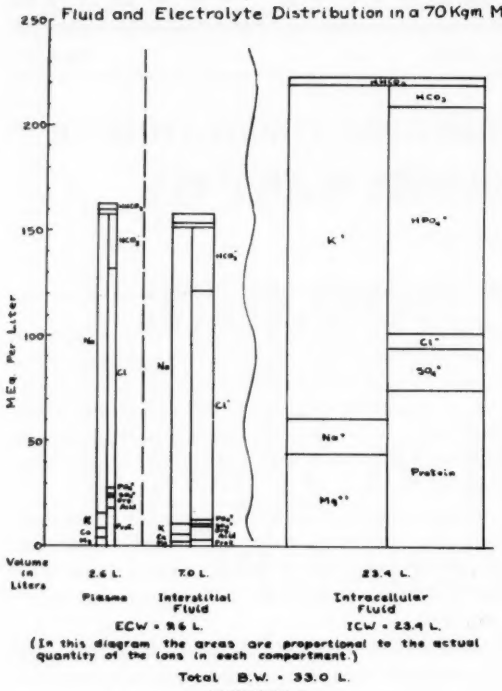

FIGURE 1

tained by energy derived from metabolic processes within the cells. Water is freely diffusible throughout both compartments and moves according to the changes in total osmolar concentration of two phases.

The extra-cellular fluid is the only pathway for transfers of substances between the cells of the body and the external environment. The movement of water and solutes between plasma and interstitial fluid depends upon the relative hydrostatic and protein osmotic pressures on either side of the capillary membrane. The circulating plasma carries constituents of body fluids to and from those organs which regulate exchanges with the external environment, namely the gastro-intestinal tract, the lungs, the skin and the kidneys. Therefore, any disease process which interferes with the function of these organs, with the function of the circulation or with cellular metabolism, results in abnormalities of the body fluids. The relative integrity of these compartments is maintained by membranes of the blood vessels and of the cells. The vascular membrane maintains that compartment by virtue of its relative impermeability to serum proteins; and the cell membranes by their impermeability to cell protein and by their selective permeability to various electrolytes.

The measurement of the total body water and of the volumes within the various compartments is fraught with technical difficulties. Figures representing the percentage of total body weight made up of water have ranged from 50 to 70% of total body weight. Figure 2 illustrates newer concepts of the percentage of body weight made up of water and the number of liters in the various compartments. It seems probable that older figures nearer 70% of the total body weight as water are being modified to a lower figure between 50 and 60% of total body weight.

AVERAGE NORMAL DISTRIBUTION OF BODY WATER

COMPARTMENT	PERCENTAGE OF BODY WEIGHT	LITERS (WEIGHT 70 Kgm)
PLASMA	5%	2.6
INTERSTITIAL	11%	7.0
EXTRACELLULAR	16%	9.6
INTRACELLULAR	40%	23.4
TOTAL BODY WATER	56%	33 liters

FIGURE 2

Former concepts of the physiology of body fluids held two postulates which are now known to be erroneous. First, cellular membranes were regarded as being practically impervious to sodium and potassium; and second, only extra-cellular fluids were thought to be accessible to fluid therapy. We now know that intra-cellular fluids undergo fairly rapid changes in both volume of fluid and concentration of electrolyte which are capable of profoundly altering acid-base equilibrium of extracellular fluid. It is further known that changes in composition of intra-cellular fluid, especially the loss of potassium and the changes in electrolyte concentrations affects the normal function of cells, disrupting enzyme systems and ultimately compromising cell respiration. Under abnormal conditions as much as ½ of the intra-cellular potassium may be replaced by about ⅔ of the equivalent amount of sodium. Furthermore, not only the extra-cellular fluid but intra-cellular fluid also may be repaired by properly calculated parenteral electrolyte solutions.

Disturbances in body water and electrolyte involve changes in (A) the volumes of body fluid compartments, (B) the electrolyte concentrations of fluid compartments, and (C) changes in acid-base balance.

Dehydration usually involves a decrease in amounts of electrolyte as well as water. If there is a decrease of relatively more water than electrolyte a primary or hypertonic dehydration results. When relatively more water is lost, electrolyte concentration rises thus increasing osmolarity. The upper

section of Figure 3 illustrates predominant water depletion. As per the osmotic rule there is a flow of water from the cells to the extra-cellular water or from the area of lesser to the area of greater concentration. Thus the dehydration is at the expense of the cells. This evokes the symptom thirst, the most important stimulus to which is an increase in the effective osmotic pressure of extra-cellular fluid or the necessary consequence of this, which is cellular dehydration. Predominant water depletion arises almost invariably from lack of intake of fluid; sodium depletion or loss of relatively more electrolyte than water is caused by abnormal losses from the body of fluid and electrolyte. This generalization stems from the inevitability of water loss from sweat, urine and expired air in the absence of intake. This is in contrast to the ability of homeostatic mechanisms to maintain an effective concentration of sodium in the presence of losses or lack of intake by renal conservation of this electrolyte under all ordinary conditions.

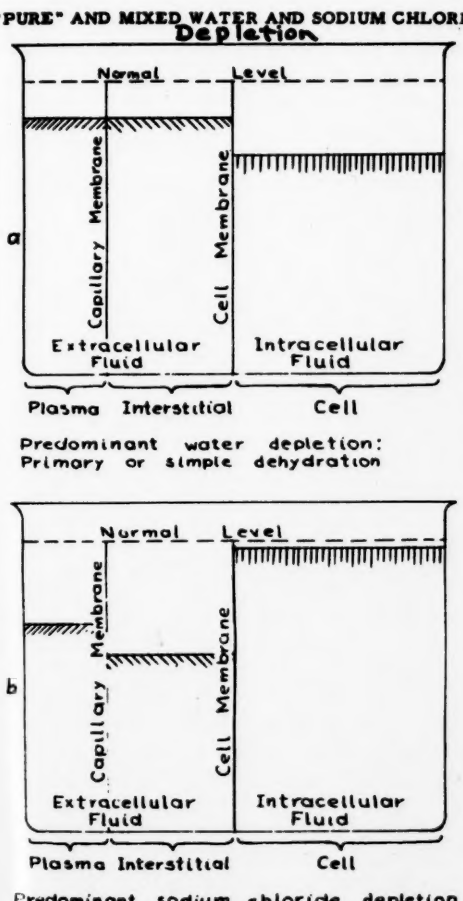

FIGURE 3

The lower section of Figure 3 illustrates a hypotonic dehydration or that in which the electrolyte loss is relatively greater than the water loss resulting ultimately in a decrease in the concentration of electrolyte in the serum. This hypotonic dehydration or hypo-osmolar state has as its central feature, a relatively greater loss of extra-cellular electrolyte than water. Again as per the osmotic rule, the flow of water is from the area of lesser to the area of greater concentration or from the plasma and interstitial fluid into the cells, thus compromising plasma volume. This dehydration then is at the expense of plasma volume or is an extra-cellular dehydration. The serum sodium and chloride finally fall; the hematocrit rises; the blood pressure declines, glomerular filtration falls and urine volume decreases as the condition progresses. The cardiac output ultimately falls strikingly. The circulation slows. The two types of dehydration, hypertonic and hypotonic are represented here as pure states which actually do not occur.

Almost every instance is one of mixed depletion with one or the other type predominating. Thirst is the "bellwether" of hypertonic dehydration and is absent in hypotonic dehydration. Figure 4[2] lists

COMPARISON OF EFFECTS OF WATER AND SALT DEPLETION

Manifestation	Pure Water Depletion	Pure Salt Depletion
Dehydration	+++ primary or simple	+++ secondary or extracellular
Thirst	+++	Absent
Lassitude	+	+++
Orthostatic fainting	Absent till late	+++
Urine volume	Scanty	Normal till late
NaCl in urine	Often +	Always absent except in Addison's disease
Vomiting	Absent	May be +++
Cramps	Absent	May be +++
Plasma NaCl	Slight increase or normal	Diminished +++
Blood urea	+	+++
Plasma volume	Normal till late	Decreased +++
Haemoconcentration	Not till late and slight	+++
Blood viscosity	Normal till late	Increased +++
Blood pressure	Normal till late	Fall +++
Water absorption	Rapid	Slow
Mode of death	? due to rise of osmotic pressure	Peripheral circulatory failure

FIGURE 4

the clinical manifestations of these two types. The sodium or salt depleted patient is dull and lethargic and, because of his decrease in plasma volume manifests orthostatic syncope. The urine volume is normal early in sodium depleted patients and decreased strikingly in the water depleted patient. With intact tubular function, sodium is present in the urine of the patient with water depletion but absent in the sodium depleted patient. Vomiting and muscle cramps are very much a part of the hypotonic picture if it occurs acutely. Plasma sodium ultimately declines. The blood urea nitrogen

[2]Marriott, H. L. Water and Salt Depletion, Charles C Thomas Publisher, Springfield, Ill., 1950.

continued on next page

rises early in the hypotonic state and hemoconcentration and decreased plasma volume appear. If the flow of water into the cells is striking and rapid in hypotonic dehydration, mild water intoxication may be present with central nervous system manifestations.

As serum electrolyte determinations have become increasingly available, the necessity for accurate interpretations of these measurements has become apparent. Misinterpretations are understandably common. One must evaluate their diagnostic significance, therapeutic implications and interpret just what the figures mean in relation to the total body water volumes; volumes of the two compartments; and, the total amount of electrolyte in the two compartments. It is highly important to be aware of the limitations of serum electrolyte studies. The only portion of body fluids that can be easily sampled is the plasma or serum. The only direct knowledge that is gained by study of these samples, is that of concentration of extra-cellular electrolyte. Any information in regard to total amount of extra-cellular electrolyte present and extra-cellular water volume present or concentrations of intra-cellular electrolyte and water volume can only be inferred indirectly from serum concentrations.

A single determination of the serum concentration of an electrolyte provides little physiologic information in itself. It requires interpretation in the light of other information. Without measurements of volumes of body fluids, which are not yet clinically available, determinations of concentration give us no direct information as to the total amount of electrolyte in question. In usual clinical medicine, an increase in the serum sodium concentration is almost always due to primary dehydration or a deficit of water in relation to sodium and other electrolytes. Invariably this is produced by lack of water intake. An increase in serum sodium concentration or hypernatremia due to a primary excess of sodium occurs only rarely, such as in the case of sea water ingestion in castaways. Hyponatremia or a low concentration of serum sodium due to losses is, however, common in clinical medicine. This finding may reflect either a deficit of sodium or an excess of water, or more commonly a combination of both. Water loss may predominate permitting a more nearly normal serum sodium concentration, albeit, with deficits of total sodium stores. Conversely, the body may contain both water and sodium in excessive amounts and still show hyponatremia, but the amount of water exceeds the amount of salt as in the low salt syndrome of congestive failure or the hyponatremic edema of the anuric patient.

In injured or post-operative patients, it is now well known that sodium is conserved by the kidney in the immediate post-operative period and that the body at that time may contain intact or excessive sodium stores. Even so, hyponatremia is observed at this time, presumably due to shift of the retained sodium into the cellular compartment.

If one focuses his attention on a determined effort to restore the serum sodium concentration to "normal" in the latter two instances he may hasten the patient's death. The concentrations of serum electrolytes must be interpreted in the light of (A) a carefully elicited history, (B) the physical findings of the particular patient, (C) the pathologic physiology of the disease, in so much as it is known, as well as (D) the patient's previous fluid and electrolyte balance.[3] A fairly accurate interpretation of serum electrolyte studies is necessary since true sodium depletion results promptly in decrease in circulatory efficiency in both the peripheral and the renal circulations.

We need to know what the body is up to before we attempt to either aid and abet or thwart its efforts. The body, in its never ending wisdom, may be doing a good job in its own defense in producing seemingly abnormal states of electrolyte equilibrium. It is well to have a healthy respect for nature's way of doing business. We should treat the total patient and not his serum sodium concentration.

The electrolyte, sodium, has not been considered to exert specific effects in comparison to the effects consequent to increase and decrease in body stores of potassium. Sodium is somewhat inert pharmacologically and in some circles it has been termed "osmotic stuffing." No one has seemed to care to take similar liberties with potassium in view of its well-known actions on neural transmission and muscular contraction.

Nevertheless sodium is present in higher concentration than any other electrolyte inside or outside the cells. It constitutes the osmotic mainstay of extra-cellular fluid. Nearly one-half of the osmotic force attributable to electrolyte in extracellular water is dependent on sodium. Sodium concentrations in normalcy are maintained within the limits of 134 to 142 m Eq./liter regardless of large fluctuations in intake. Appropriate changes in renal excretion permit this. When intake of sodium is reduced to zero, the urinary excretion of sodium becomes negligible. Early in sodium depletion the volume of extra-cellular fluid is sacrificed in order to maintain concentration satisfactorily. Hence, in sodium depletion, the initial event is not characterized by change in concentration but only in volume of extra-cellular fluid, and later sodium concentration falls.

[3]Squires, R. D. and Elkington, J. R. The Clinical Interpretations of Common Abnormalities in the Serum Concentrations of Certain Electrolytes. The Med. Clin. of N.A. Vol. 35, No. 6, Nov., 1951.

The tubular effort on the part of the kidney to maintain normal serum sodium concentration carries over in disease states tending to deplete body stores of this electrolyte. Early in sodium depletion the intact kidney maintains normal extra-cellular concentrations though this may necessitate loss of body water to raise concentration. The urine excreted at this time is of adequate volume and is practically sodium and chloride free. If historical data show that the patient has lost sodium from body fluids and still does not complain of thirst, this finding is a very reliable clinical clue to the presence of sodium depletion.

When the limits of renal compensation have been reached urinary volume declines. Serum sodium concentrations can no longer be maintained and hyponatremia occurs. The body finally sacrifices concentration or tonicity for volume. Hyponatremia is present only when (A) there has occurred losses of sodium with relatively equivalent quantities of water followed by replacement of water only or (B) when losses of sodium have occurred in relatively greater amounts than water, such as in gastric or intestinal lavage with distilled water. We should not lose sight of the fact that normal or high concentrations of serum sodium may occasionally be found in the face of depletion of total body stores if the water balance has been negative during the period of sodium loss.

Sodium depletion may be present in varying degrees of severity depending upon the rapidity with which losses occur, the integrity of compensatory mechanisms and the magnitude of the losses. Dietary deficiency of sodium is not in itself a serious cause of sodium depletion though it may aggravate depletion produced in other ways. Clinically, significant sodium depletion arises only when loss of sodium from the body is abnormally great. In the tropics, in mines or among stokers, the necessity of thermo-regulation imposes a loss of sodium in the sweat which may suffice to bring about either acute or chronic sodium depletion in otherwise well people.

In disease, sodium depletion arises either from (A) external losses of gastro-intestinal secretions or (B) increased urinary excretion of sodium. The various gastro-intestinal secretions contain about 1000 m.Eq. of sodium per day. This represents ⅓ of the total sodium content of the body and is five times as great as the average daily dietary intake of sodium. The stools normally contain less than 10 mEq. of sodium per day. Re-absorption of alimentary tract sodium is carried out with an efficiency comparable to that of the renal tubule. Medical historians have recorded how cholera has produced sodium depletion and circulatory collapse in a few hours. However, wastage of digestive substances is usually much less extreme and the syndrome of sodium depletion manifests itself much more slowly. The majority of cases of sodium depletion are probably due to gastro-intestinal losses of one sort or another. Urinary losses of sodium are not rare but this channel of sodium loss is far less obvious than the gastro-intestinal route. Sodium depletion due to primary renal disease is actually quite uncommon.

Other than from intrinsic renal disease sodium may be lost to excess in the urine in Addison's disease, in osmotic diuresis and in metabolic acidosis. In diabetic acidosis the osmotic diuresis is produced by glucose as the loading solute. Urine volume rises and with it the rate of sodium excretion. Urea may act as a loading solute in osmotic diuresis of renal failure. As the syndrome of lower nephron nephrosis goes into the diuretic phase, urea may act as a loading solute, increasing the output of urine and with it loss of sodium. With excessive production of acid substances in the body from any cause, such as diabetic acidosis or increased breakdown of fat or protein, in debilitating diseases, their excretion must be partly covered by base which is largely sodium. Sodium excretion may be increased deliberately by the use of mercurial diuretics and this occasionally may lead to the low salt syndrome even in the presence of edema. There is occasionally an unfortunate tendency in the case of congestive failure to assume the sodium depletion syndrome on the basis of hyponatremia alone. It seems probably that true sodium depletion shock in congestive heart failure is more frequently treated than it actually occurs.

I would like to present briefly some established experimental studies that have clinical usefulness. Experimentally the syndrome of sodium depletion can be produced in animals by the injection into the peritoneal space of a glucose solution. Figure 5 illustrates the sequence of events. The glucose solution, salt free, is placed in the peritoneal cavity and as the upper part of the slide illustrates there is diffusion of sodium and other electrolytes into the glucose solution which is subsequently withdrawn from the peritoneal space in three or four hours, resulting in sodium depletion. The extracellular hypotonicity of loss of concentration consequent to electrolyte shift results in a movement of water into the cells in an effort to raise extracellular electrolyte concentration and maintain osmolarity. Thus, it can be seen in the lower section that extra-cellular water loses both volume and concentration and with shift of water into the cells there is loss of concentration in the cells and if any change, an increase in volume. With the fall in extra-cellular volume, there is loss of circulatory integrity or frank shock.

With dehydration of the extra-cellular space, plasma volume declines, plasma protein is lost in

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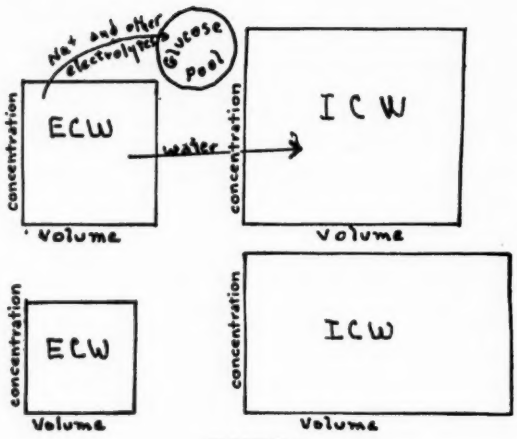


FIGURE 5

an unknown way. As the plasma volume falls the circulation slows, the hematocrit rises, the cardiac output falls and blood pressure declines. This sodium depletion shock is clinically indistinguishable from that following blood loss or trauma and carries the same prognostic implications and therapeutic urgency.

Would re-expansion of plasma volume restore circulatory efficiency? Is the decline in plasma volume, *per se,* responsible for the circulatory collapse? Restoration of volume of extra-cellular fluid by means of salt free glucose solutions has no influence on the blood pressure, circulation time and cardiac output in sodium depleted animals and their circulatory efficiency further declines.

Would correction of the hypotonicity or a restoration of the decreased sodium concentration of extra-cellular fluid, of itself, restore circulatory efficiency? In the experimental animal this can be accomplished by the intravenous injection of urea, resulting in an osmotic diuresis with loss of a great deal of water but very little sodium. Thus, concentration or tonicity increases but the total sodium deficit is not restored. Again circulatory efficiency is not improved and instead, if any change is observed, it is a worsening of cardio-vascular function. Thus it is apparent that hyponatremia or low sodium concentration itself is not responsible for the shock mechanism. Solutions of saline which restore not only concentrations but also total sodium stores result in return to normal circulatory efficiency.

In any clinical problem entailing consideration of extra-cellular sodium stores, one must think in terms of (A) the concentration of sodium, (B) the volume of extra-cellular fluid in which it is contained and (C) the total amount of sodium in the body.

When total sodium stores have been depleted and hyponatremia is present the use of hypertonic saline solution may be urgent. The quantity of sodium necessary to restore tonicity of extra-cellular fluid should be estimated as that amount necessary to restore normal osmolarity not only in the extra-cellular space but throughout the total body water. Though sodium ions are restricted to the extra-cellular space in the main, the calculation of sodium requirement should be determined on the basis of total body water. Any change in the concentration of sodium in the extra-cellular space will result in shifts of water from the cells to extra-cellular water to re-establish osmotic equilibrium.

CALCULATION OF TOTAL AMOUNT Na DEFICIT

Normal or desired (Nas) 138 m Eq/liter
Patient's (Nas) 125 m Eq/liter

138 m Eq/liter
125 m Eq/liter
13 m Eq/liter deficit of sodium

Patient's weight in Kgm = 55

60% of body weight is water and 60% of 55 Kgm = 33 Kgm or 33 liters = estimated total body water.

13 m Eq. x 33 liters = 429 m Eq. Na = Total deficit

FIGURE 6

Figure 6 illustrates the method of calculating sodium deficit. To arrive at this figure one may subtract the serum sodium concentration of the patient from the desired serum sodium concentration or normal of 135-140 mEq. This figure is multiplied times the total body water volume in liters. The total body water in liters may be obtained by assuming that about 60% of the patient's ideal body weight is water. This is expressed in kilograms and will give one the number of liters of total body water. This figure is multiplied times the number of mEq. deficit/liter and this figure in mEq. of sodium is administered.

Once sodium depletion shock is diagnosed, therapy is urgent. Experimental evidence has clinical usefulness and demonstrates that early therapy with saline solutions repairs the sodium deficits and returns the circulatory state toward normalcy. The ideal, of course, is to prevent sodium depletion shock or to repair deficits early rather than when circulatory collapse has occurred. One should regard the drop in blood pressure as an indication of a departed opportunity rather than impending sodium depletion shock. The concept that shock mechanism of any etiology, allowed to persist untreated reaches an irreversible phase, has clear application here. Hence, delayed therapy when shock has occurred is much less effective and may be useless. Isotonic or hypertonic saline solutions may be used depending on the urgency of the clinical situation.

continued on page 659

PREVALENCE OF DENTAL CARIES IN PRIMARY AND PERMANENT TEETH

A Study of 8,853 School Children

THOMAS W. CLUNE, D.M.D., M.P.H.

The Author. *Thomas W. Clune, D.M.D., M.P.H., of Cranston, R. I. Past President, Rhode Island State Dental Society; Public Health Dentist, Rhode Island State Department of Health.*

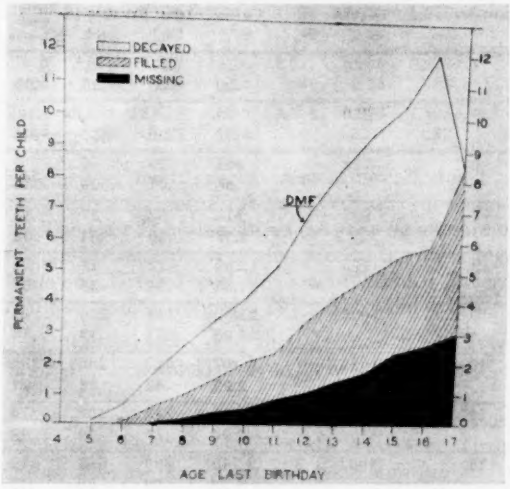
PREVIOUS EPIDEMIOLOGICAL STUDIES have established that there is an inverse relationship between the fluoride content of water and the incidence of dental caries.[1] Further controlled studies have been undertaken in an effort to evaluate the effects of adjusting the fluoride content of municipal water supplies to the optimum level of 1.0 to 1.5 p.p.m. of Fluoride (F).[2-3] During the past 6 years, preliminary and periodic annual reports have shown favorable results and clearly indicate that the fluoridation of municipal water supplies is a safe, beneficial, inexpensive and practical public health procedure. These studies further demonstrate that it is possible during the formative period of the teeth (birth to age 8 years) to reduce the incidence of dental carries by as much as 65 percent.[4-11]

Fluoridation of the municipal water supply of the greater metropolitan area of Providence was initiated on August 13, 1952. The Providence Water Supply Board, a department of the City of Providence governmental body, in addition to furnishing water to the City of Providence, also supplies the communities of Cranston, Johnston, North Providence, Smithfield and Warwick. Since that date approximately 380,000 users of the water supplied by that authority have been receiving the protective benefits of fluoridation.

In order to justify the expense and to demonstrate the benefits of this proved public health procedure, it was clearly evident to dental and health authorities that accurate scientific base line data should be collected. This was deemed necessary in order that the participating communities would know and understand the problem, and as a factual method of evaluating the benefits of this scientific procedure.

A standard technic (DMF Dental Caries Survey)† for measuring the prevalence of dental caries among school children proposed by the Public Health Dentist was approved by the House of Delegates of the Rhode Island State Dental Society. It is the one used in this study and is the basic base line survey recommended by that organization to its component members, i.e., the respective societies of the counties and subdivisions of the State.

Caries Prevalence in Permanent Teeth
Providence, Rhode Island
Ages 4-17



Selected Study Area

Between November 10, 1952 and February 5, 1953, a DMF Dental Caries Survey was undertaken by the Rhode Island State Department of Health with the approval of the President of the Providence District Dental Society, the Superintendent of Schools, the Diocesan Director of Parochial Schools and the Superintendent of Health of the City of Providence.

Because of the tremendous enrollment in both school systems (35,142), it was felt that accurate

continued on next page

†Explanatory Note: DMF is an actual count of the number of Decayed, Missing and Filled permanent teeth. Missing teeth include (1) teeth previously extracted and (2) extractions indicated, (decayed beyond repair).
def is an actual count of decayed, extractions indicated (decayed beyond repair) and filled primary teeth.
A tooth previously filled, but showing evidence of new caries is recorded as a decayed tooth. Specific Rates for both are obtained by dividing the actual counts by the number of children.

basic data could be collected by a sampling of children in certain geographic areas of the city. In employing this technic of sampling, we feel that we have obtained a most comprehensive study as to the prevalence of dental caries in this cosmopolitan area, since all economic levels and racial groups have been included in this survey.

Base Line Examinations

In November 1952, approximately three months after fluoridation was started, Dr. Thomas L. Hagan, Chief of the Division of Dental Public Health, United States Public Health Service, assigned to the Public Health Dentist of the State Department of Health two commissioned officers and two clerks to conduct the dental examinations. Six separate geographic areas of the city were visited by the examining team, namely: Smith Hill, Mt. Pleasant, East Side, Fox Point, South Providence and Federal Hill sections.

8,853 were examined in the elementary grades, kindergarten through grade IX, (ages 4-17 inclusive) in both public and parochial school systems, or approximately 25 percent of the total school enrollment. The trained dental officers conducted these examinations in selected, well-lighted school rooms, using standard plain mouth mirrors and No. 3 s.s.w. double end explorers. The source of light was further supplemented by the use of a standard examination lamp. For each child, the examiner made a total count of the decayed, missing and filled permanent teeth, and an additional count of the decayed, extractions indicated and filled primary teeth. The need for dental care was also recorded. The findings were transmitted in code to the recording clerk and entered on the survey sheet. In recording the findings, the recorder kept separate sheets for children of the same age, grade and sex. This facilitated the direct transfer to punch cards so that the processing of the data could be handled with mechanical devices. A short orientation or training period was used to acquaint the examiners and clerks with the code and survey forms and to establish consistency among the examiners in their subjective diagnoses.

TABLE 1

Caries Prevalence in Permanent and Primary Teeth by Age Groups

Age Last Birthday	Number of Children	PERMANENT TEETH						PRIMARY TEETH				TREATMENT	
		Carious	Missing Total	Missing Extracted	Extractions Indicated	Filled	Total DMF	Carious	Extractions Indicated	Filled	Total def	Needed	Not Needed
4	36	.....	.....	.....	.....	.....	.....	117	3	18	138	23	13
		.00	.00	.00	.00	.00	.00	3.25	.08	.50	3.83	.64	.36
5	250	29	.....	.....	.....	.....	29	995	65	193	1,253	195	55
		.12	.00	.00	.00	.00	.12	3.98	.26	.77	5.01	.78	.22
6	718	401	10	6	4	58	469	2,600	509	642	3,751	578	140
		.56	.01	.008	.005	.08	.65	3.62	.71	.89	5.22	.81	.19
7	696	813	38	27	11	324	1,175	2,246	487	703	3,436	556	140
		1.17	.05	.04	.02	.47	1.69	3.23	.70	1.01	4.94	.80	.20
8	775	1,285	112	61	51	614	2,011	2,211	640	736	3,587	665	110
		1.66	.14	.08	.07	.79	2.59	2.85	.83	.95	4.63	.86	.14
9	1035	2,032	344	200	144	1,139	3,515	2,159	642	805	3,606	893	142
		1.96	.33	.19	.14	1.10	3.40	2.09	.62	.78	3.48	.86	.14
10	1086	2,407	517	285	232	1,595	4,519	1,438	455	471	2,364	926	160
		2.22	.48	.26	.21	1.47	4.16	1.32	.42	.43	2.18	.85	.15
11	956	2,815	737	467	270	1,450	5,002	644	227	192	1,063	782	174
		2.94	.77	.49	.28	1.52	5.23	.67	.24	.20	1.11	.82	.18
12	1002	3,740	993	661	332	2,348	7,081	153	119	75	347	818	184
		3.73	.99	.66	.33	2.34	7.07	.15	.12	.07	.35	.82	.18
13	1014	4,349	1,335	925	410	2,869	8,553	37	34	27	98	802	212
		4.29	1.34	.91	.40	2.83	8.43	.04	.03	.03	.10	.79	.21
14	850	3,976	1,396	979	417	2,748	8,120	16	16	14	46	690	160
		4.68	1.64	1.15	.49	3.23	9.55	.02	.02	.02	.05	.81	.19
15	387	1,907	888	557	331	1,249	4,044	1	1	2	4	333	54
		4.93	2.29	1.44	.86	3.23	10.45	.002	.002	.005	.01	.86	.14
16	46	285	118	81	37	151	554	.....	.....	.....	.....	37	9
		6.20	2.57	1.76	.80	3.28	12.04	.00	.00	.00	.00	.80	.20
17	2	.....	6	6	.....	11	17	.....	.....	.....	.....	.....	2
		.00	3.00	3.00	.00	5.50	8.50	.00	.00	.00	.00	.00	1.00
4-17	8,853	24,039	6,494	4,255	2,239	14,556	45,089	12,617	3,198	3,878	19,693	7,298	1,555
		2.72	.73	.48	.25	1.64	5.09	1.43	.36	.44	2.22	.82	.18

Table I shows the age distribution of the children examined and amply demonstrates that dental caries, the most prevalent of diseases affecting mankind, has truly become a public health problem. The table shows that this universal disease starts early in life and is progressive, causing tooth mortality unless treated by a dentist.

Of the total children examined, 7,298 or 82 percent need dental treatment, 1,555 or 18 percent, needed no dental care. Children were considered as needing care only if there was evidence of a need for fillings or extractions. Replacement of missing teeth and orthodontics were not considered as urgent dental care.

The total DMF for all ages was 45,089 or a rate of 5.09 per child. The total def for all ages was 19,693, or a rate of 2.22. Combining the two, we have a rate of 7.31, or a tooth morbidity and mortality rate of approximately 7⅓ teeth for each individual child. The dental caries attack rate in all categories is extremely high, averaging 4.15 carious teeth, 1.09 teeth indicated for extraction or missing and 2.08 filled teeth per child. Starting with the youngest group (age 4) it becomes progressive in the primary teeth to about age 9, which is the age when most primary teeth have been exfoliated or shed. However, it does not abruptly cease there, but continues its upward trend in the permanent teeth through all age groups to reach a peak at age 16. The absence of permanent teeth in the 4 year old group, the limited number of permanent teeth in 5 year olds and the small sample of 16 and 17 year olds make it urgent that we exercise caution in the interpretation of findings in permanent teeth for these age groups. The same caution should be exercised in the findings of the primary teeth in the age groups of 10 to 17 inclusive.

If the rates were adjusted for the permanent teeth (ages 6-15) and for the primary teeth (ages 4-9) this would result in a considerably higher rate for all categories at all age levels.

TABLE II

Caries Prevalence in Permanent and Primary Teeth by Sex

		PERMANENT TEETH						PRIMARY TEETH				TREATMENT	
	Sex	Carious	Missing Total	Missing Extracted	Extractions Indicated	Filled	Total DMF	Carious	Extractions Indicated	Filled	Total def	Needed	Not Needed
Male	4,448	11,789	3,177	2,025	1,152	6,588	21,554	6,655	1,672	1,850	10,177	3,675	773
		2.65	.71	.46	.26	1.48	4.85	1.50	.38	.42	2.29	.83	.17
Female	4,405	12,250	3,317	2,230	1,087	7,968	23,535	5,962	1,526	2,028	9,516	3,623	782
		2.78	.75	.51	.25	1.81	5.34	1.35	.35	.46	2.16	.82	.18
Both	8,853	24,039	6,494	4,255	2,239	14,556	45,089	12,617	3,198	3,878	19,693	7,298	1,555
		2.72	.73	.48	.25	1.64	5.09	1.43	.36	.44	2.22	.82	.18

Table II, arranged by sex groups, shows for the permanent teeth the DMF rate for girls to be 5.34 to 4.85 for boys, or about ½ tooth more per girl. This is indicated by slightly higher carious and missing rates and an even higher filled rate among the girls. For the primary teeth, the situation becomes reversed with the boys having the higher def of 2.29 to 2.16 for the girls. This difference, while but slight, is primarily due to a higher carious rate among boys in the primary teeth. Indications for treatment in both groups are relatively the same, bordering on the overall average of 82 percent needing care and 18 percent not needing treatment.

Table III is arranged by school and sections and the rates have been figured for the sections, and not for the respective schools. The difference in rates between sections depends on whether or not the dental caries experience has been mild or severe and will vary accordingly.

Permanent Teeth—The total DMF rate ranges from 3.48 for Fox Point to a high of 6.36 for Smith Hill.

The carious rate varies from 1.82 for Fox Point to a high of 3.90 for Smith Hill. The total number of missing teeth ranges from a low .39 for Fox Point to a high of .89 for the Federal Hill section.

The East Side area shows the greatest amount of dental corrections, with that section having a high rate of 2.37 filled teeth to a low of 1.02 for Federal Hill section, or roughly, 2⅓ teeth to one tooth.

Primary Teeth—The total def rate ranges from 1.83 for Federal Hill to a high of 3.03 for Fox Point section.

The carious rate varies from .96 for the East Side to a high of 1.69 for Mt. Pleasant. Three other sections show about the same high rate.

In the category of extractions indicated, the rate ranges from a low of .18 for Mt. Pleasant to a high of .63 for Fox Point.

Filled rates range from .20 for the Smith Hill section to a high of .71 for Fox Point.

With respect to dental care, it appears that the children of the East Side area require the least amount of dental services since but 75 percent need treatment.

The greatest amount of dental care is needed in the Smith Hill area since 90 percent of the children are in the category of care needed.

continued on next page

TABLE III

Caries Prevalence in Permanent and Primary Teeth by Schools and Sections

School and Section		PERMANENT TEETH						PRIMARY TEETH				TREATMENT	
		Carious	Missing Total	Missing Extracted	Extractions Indicated	Filled	Total DMF	Carious	Extractions Indicated	Filled	Total def	Needed	Not Needed
St. Patrick's		2,047	346	269	77	524	2,917	1,539	135	173	1,847	524	24
Candace		1,330	174	107	67	306	1,810	1,114	170	130	1,414	400	33
Nathanael Greene		3,009	886	612	274	1,802	5,697	49	11	32	92	554	104
Smith Hill	**Total**	6,386	1,406	988	418	2,632	10,424	2,702	316	335	3,353	1,478	161
	Rate	**3.90**	**.86**	**.60**	**.26**	**1.61**	**6.36**	**1.65**	**.19**	**.20**	**2.05**	**.90**	**.10**
Blessed Sacrament		1,512	356	278	78	1,072	2,940	1,709	139	427	2,275	630	142
Academy Avenue		800	170	101	69	312	1,282	364	70	66	500	246	28
Putnam Street		371	38	29	9	165	574	957	114	162	1,233	238	46
George J. West		1,942	610	523	87	1,394	3,946	27	8	8	43	396	82
Mt. Pleasant	**Total**	4,625	1,174	931	243	2,943	8,742	3,057	331	663	4,051	1,510	298
	Rate	**2.56**	**.65**	**.51**	**.13**	**1.62**	**4.84**	**1.69**	**.18**	**.37**	**2.24**	**.84**	**.16**
Holy Name		1,161	259	194	65	1,021	2,441	815	428	355	1,598	365	40
John Howland		356	38	30	8	574	968	684	116	611	1,411	275	152
Nathan Bishop		2,720	1,171	654	517	2,498	6,389	152	143	136	431	647	246
East Side	**Total**	4,237	1,468	878	590	4,093	9,798	1,651	687	1,102	3,440	1,287	438
	Rate	**2.46**	**.85**	**.51**	**.34**	**2.37**	**5.68**	**.96**	**.40**	**.64**	**1.99**	**.75**	**.25**
St. Joseph's		807	179	107	72	609	1,595	562	224	297	1,083	329	81
Arnold Street		103	16	15	1	31	150	280	91	63	434	82	9
Fox Point	**Total**	910	195	122	73	640	1,745	842	315	360	1,517	411	90
	Rate	**1.82**	**.39**	**.24**	**.15**	**1.26**	**3.48**	**1.66**	**.63**	**.71**	**3.03**	**.82**	**.18**
St. Michael's		2,147	586	415	171	2,181	4,914	1,461	625	786	2,872	843	264
Temple Street		608	100	69	31	185	893	915	207	145	1,267	293	34
So. Providence	**Total**	2,755	686	484	202	2,366	5,807	2,376	832	931	4,139	1,136	298
	Rate	**1.92**	**.48**	**.34**	**.14**	**1.65**	**4.05**	**1.66**	**.58**	**.65**	**2.89**	**.79**	**.21**
Holy Ghost		619	163	101	62	370	1,152	466	134	173	773	257	65
Kenyon Street		2,669	693	333	360	818	4,180	1,504	557	299	2,360	894	120
Bridgham		1,838	709	418	291	694	3,241	19	26	15	60	325	85
Federal Hill	**Total**	5,126	1,565	852	713	1,882	8,573	1,989	717	487	3,193	1,476	270
	Rate	**2.94**	**.89**	**.49**	**.41**	**1.02**	**4.90**	**1.14**	**.42**	**.28**	**1.83**	**.85**	**.15**
Grand Total		24,039	6,494	4,255	2,239	14,556	45,089	12,617	3,198	3,878	19,693	7,298	1,555
Rate		**2.72**	**.73**	**.48**	**.25**	**1.64**	**5.09**	**1.43**	**.36**	**.44**	**2.22**	**.82**	**.18**

Extent of the Problem

While the figures for Providence may seem appalling, it must be borne in mind that New England has the highest dental caries attack rate in the country.[12,13,14] If such a survey were conducted in the other cities and towns of the State, the findings would be identical or perhaps even worse than those of Providence, since the majority of the practicing dentists in the State are located in the Providence area. There is but one possible exception, namely: Woonsocket, where a 7 year dental care study has been recently completed.

The dental caries prevalence expressed in terms of unmet needs (untreated) and met needs (treated) is as follows:

Unmet Needs (untreated)

Permanent Teeth	24,039 — decayed teeth
Permanent Teeth	2,239 — indicated for extraction
Primary Teeth	12,617 — decayed teeth
Primary Teeth	3,198 — indicated for extraction
Total	42,093 — teeth requiring treatment

Met Needs (treated)

Permanent Teeth	14,556 — previously filled
Permanent Teeth	4,255 — previously extracted
Primary Teeth	3,878 — previously filled
Total	22,689 — teeth treated

Since our sample was but 25 percent of the total school population, our projected figures for the total enrollment would be 4 × 42,093, or a total of 168,372 teeth requiring treatment.

An Estimate of the Problem

Some basic estimations are essential for an adequate understanding of the situation in the City of Providence.

There are approximately 250 dentists for Providence's 248,670 people, or about one dentist for every 1,000 people, compared with the national ratio of 1 for 1900.[15]

The Age Group — 4 to 17 years
Number of Children — 35,000
Estimated Annual Tooth Decay Rate — 1 tooth per child per year
Total Per Year — 35,000 teeth (not tooth surfaces)

Dentist Man-Hours Required

For the annual increment

Per tooth ..... ½ hour
35,000 teeth ..... 17,500 dentist man-hours

For the backlog

168,372 untreated teeth, or roughly — 84,000 dentist man-hours (at rate of ½ hour per tooth)

or $\frac{84,000}{250}$ ..... 336 hours per dentist each year

or ..... 56 dentists working full time for 1 year (1500 hours) exclusively for the age group, 4 to 17 years

And while the 56 dentists are taking care of the backlog, 35,000 more teeth will have begun to show evidence of dental decay. This annual increment would require 12 additional dentists. In addition, there would remain less than 200 dentists for the 215,000 people in the other age groups.

The reverse of the above situation is what we find in practice today, with the children getting the short end of the available service. The solution for the existing impasse is not the vain hope for more dentists, but the effective use of the preventive measures that we have available.

While the future looks bright through the use of fluoridated water, it must be borne in mind that fluoridation in itself is not the complete answer or cure-all to the problem of dental caries.

All of us, and children in particular, should continue to:

1. Practice good daily oral hygiene.
2. Visit the dentist regularly for periodic checkup.
3. Eat a properly balanced diet.
4. Be moderate, or better still, curtail sharply the use of refined carbohydrates, candies and sweetened carbonated beverages.

SUMMARY

8,853 public and parochial school children (ages 4-17 years) kindergarten through Grade IX were given dental examinations in a study project to determine the prevalence of dental caries.

7,298, or 82 percent, need dental treatment; 1,555, or 18 percent, do not need dental care.

The total DMF (all ages) was 45,089, or a rate of 5.09 per child. The total def (all ages) was 19,693, or a rate of 2.22.

A total of 42,093 teeth require treatment; 22,689 teeth have been previously treated.

Since but 25 percent of the total school population was examined, it is estimated that 168,372 teeth in the total school population would require treatment.

The number of dentist man-hours required to care for the backlog of accumulated dental caries would be 84,000, or 56 dentists working full time for 1 year (1,500 hours).

To care for the annual increment would require 12 additional dentists.

Recommendations

In order to evaluate the benefits of fluoridation of municipal water supplies, it is recommended that a similar survey, or a reasonable sampling of the same geographical areas should be repeated at intervals of 5 and 10 years.

Acknowledgments

The author wishes to acknowledge the assistance and support of the dental study received from Dr. Thomas L. Hagan, Chief of the Division of Dental Public Health, United States Public Health Service. The study was made possible by the loan from Dr. Hagan of two Commissioned Officers of the Public Health Service who were the examining dentists (Drs. Carl E. Johnson and Neil C. Leonard, Jr.) and the recorders (Miss Kathan Kennedy and Mrs. Agnes Asselin). The author gratefully acknowledges their services.

The author acknowledges the approvals, support and endorsement of the project received from Rt. Rev. Monsignor Thomas V. Cassidy, Diocesan Director of Parochial Schools; Dr. James L. Hanley, Superintendent of Schools; George J. O'Brien, Assistant Superintendent of Schools; Dr. Joseph Smith, Superintendent of Providence Health Department; Dr. Hubert H. McGuirl, President of the Rhode Island State Dental Society; Dr. John J. Carmody, Supervising School Dentist, and Sarah Nagle, R.N., Director of Nurses, Providence Health Department.

Further acknowledgments and sincere thanks are extended to the several principals, religious and lay teachers for their tolerance and indulgence. Their help and assistance made the task pleasurable and less burdensome.

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CONSULTATION SERVICES FOR CHILDREN WITH RETARDED MENTAL DEVELOPMENT

HERMAN B. MARKS, M.D.

A Report prepared at the request of the Rhode Island State Chairman, American Academy of Pediatrics

The following report was prepared originally for the State Chairman of the American Academy of Pediatrics and is now published in the RHODE ISLAND MEDICAL JOURNAL with his approval. It is presented at this time for the purpose of acquainting the members of the Rhode Island Medical Society with the services offered by the State Consultation Services for Children with Retarded Mental Development.

The author, as a member of the Rhode Island Medical Society and as a practicing pediatrician in this community, felt that this program should not continue unless its policies and practices were approved by the Medical Society and accordingly requested the Council to review the program. After making a study of the program, the Council approved it in its present form.

THE EDITOR

AS PRACTICING PEDIATRICIANS, we all know that often after having made a diagnosis of mental retardation in a child, aside from giving sympathy and support, there is not much we can offer to parents. For a few children whose parents can afford it, there are a few good residential schools, but for most people such a recommendation is either a great financial hardship or altogether prohibitive. For a long time now in Rhode Island, individual fathers and mothers who have had the misfortune to be parents of retarded children, have been overwhelmed by the futility of trying to do something to improve the available facilities for the training of their children.

I. *How the Consultation Service came to be Established*

In October 1950, a number of parents of retarded children, realizing that by individual efforts they could accomplish very little, organized themselves into a group to which they gave the name, "The Parents Council for Retarded Children." This organization serves many useful purposes. Perhaps the most important one is that by concerted, organized, constructive efforts, acting through their Council, parents could bring about changes which, acting individually, they could never attain.

In August 1952, The Parents Council requested the Governor to allocate State funds for a number of projects relating to services for retarded children. One of the projects that was requested was the establishment of a diagnostic clinic for the evaluation of retarded children. After consultation with the Director of the Department of Social Welfare, the Commissioner of the Department of Education, and the Director of the Department of Health, the Governor approved the establishment of a consultation service for retarded children within Mental Hygiene Services. In February 1953, Dr. Bernard O. Wise, Chief Clinical Psychiatrist of Mental Hygiene Services, asked me to undertake the organization of this service and begin evaluation of retarded children whose parents requested this service.

II. *Organization of the Consultation Service*

Children are accepted for study at the request of their parents in the order in which they have applied. In each individual case, a complete medical history is taken, a physical examination is given, and appropriate psychological tests are administered. In addition to my services which are provided on a part-time basis, Mental Hygiene Services make available to the program the services of its full-time psychiatric clinical teams. In order to make evaluation as complete as possible, previous records from hospitals, other clinics, schools, and from private physicians may be requested.

At the present time we have a waiting list of ninety-seven patients. Seventy-eight children have been fully evaluated. Out of this group of presumably retarded children, we have found six of normal intelligence. There are seven other children in this group of seventy-eight who, on the basis of their psychological testing, must be classified as retarded, but their emotional problems are so severe that they interfere with the children's functioning at their optimal capacities. These children are currently being seen in our program, and any final evaluation of their capacities will be deferred until they have had the benefit of further study and help.

Out of the remaining children of this group of seventy-eight, there have been fifteen children whose mental deficit is so great that we have had to reluctantly tell their parents that there was nothing that we could do for them, except to help them

plan for their children's custodial care, and to give the parents support and guidance in their anguish that such a rational but difficult step provokes. From this group of seventy-eight children that have been completely evaluated, we have found twenty-two children who although retarded are definitely trainable and educable. These children, with proper training and guidance, can become self-supporting citizens of the community. There are twenty-eight children in this group who are not educable, but who are definitely trainable and can be trained to work under supervision.

I present, rather sketchily, this brief summary of work done thus far to show that diagnostic evaluation of children with retarded mental growth offers a great deal. Many of these children have potentials for growth, for training, and for education that parents and educators may sometimes overlook.

III. *Policies*

No child is accepted for study in this program without a referral from a physician. It is planned that the referring physician will be informed of the evaluation of each individual case. The only investigation undertaken consists of the history, the physical examination, and the psychological testing. If it is felt that a child requires specialized testing, such as tests of auditory acuity, electroencephalography, etc., he will be referred back to his own physician for this, or if the individual physician prefers, with his consent, Consultation Services will arrange to have these tests done.

IV. *What are the Advantages of a Consultation Service?*

From a purely diagnostic point of view, as I have attempted to demonstrate, the program serves a useful purpose. Secondly, there are many unsolved problems in the field of mental retardation. Any program which makes evaluations of retarded children should try, within the scope of its services, to attempt to solve some of these problems. The gathering of accurate data and the correlation of observed and demonstrated findings can result in valuable contributions in some of the thus far unsolved problems in this field. However, we feel that the program has yet another important function. If, by careful evaluation of individual children, recommendations for training of these children are made and the resources in the community are not adequate to fulfill these recommendations, then parents acting through their own group may make legitimate requests for these services.

There can be no logical demand from parents for improving the education of retarded children until the needs for improving them can be demonstrated. Similarly, the development of programs for vocational training and leisure time activities for retarded children requires a demonstration of unmet needs of these community resources. By comprehensive evaluation of individual children, the Consultation Services can help to demonstrate what community resources for retarded children need to be developed.

There are many handicapped children—the children with rheumatic heart disease; the children with cerebral palsy; the crippled children; the emotionally disturbed children. They are all worthy of and do receive essential services. It is conservatively estimated that two percent of the population of any community is retarded. Translated into figures, this would mean that there are 15,000 retarded individuals in Rhode Island. How many of them are children who are educable or trainable, or both, is not known at the present time. We hope that, through this program, the answers will be forthcoming. Whether these children who may be trainable and educable will remain in the shadows of their own homes or whether, due to the enlightened development of training programs of proven value, these children will take their places as self-supporting members of the community, depends to a large extent on how successful their parents can be in influencing responsible civic authorities to expand these programs.

NEWER ASPECTS OF SODIUM METABOLISM

continued from page 652

The combined use of blood, plasma or albumin solutions along with saline, offers definite advantages. Their combined use may be successful in restoring circulatory efficiency in instances where either alone would fail. Since the irreversibility of shock mechanism is an indeterminate issue, the optimum therapy includes both saline, and plasma, blood or albumin.

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A HIGH GRADE MEETING

THE FALL AND WINTER series of medical meetings is opening with a bang. Rarely do we have the privilege of attending a better medical meeting than the first one of the Providence Medical Association, and; by the way, why will presidents and secretaries of this dignified, more than a century-old organization refer to it as the Providence Medical *Society*? Certainly those officials ought to know with whom they are connected.

The Association seems to be thriving. There was a very large number of new members taken in at this meeting. Their quality is good also. There is no doubt that the modern medical school graduate who is not good, is decidedly an exception.

The scientific part of the meeting was not at all of the routine type, for the smart Committee on Programs provided us with a Clinical-Pathological Conference. Well conducted CPC's are always good, and this one was tops. A snappy pace was set at the beginning by the moderator, Alex M. Burgess, SR., M.D., when he called our attention to the fact that this might well be considered a Yale-Harvard game with Dr. Ivan L. Bennett, JR., Assistant Professor of Medicine at Yale, kicking off and the ball being handsomely returned by Dr. F. Dennette Adams, Assistant Clinical Professor of Medicine on the Harvard side. Dr. Adams hastened to let us know, however, that there was considerable confusion in the "Ivy League" by informing us "cold-blooded New Englanders" that he was a Princeton graduate, and Dr. Bennett waved the Confederate flag and told us that he was from Emory in Georgia.

It certainly was a diversified group on the platform with Dr. Burgess from Brown and Harvard Medical, Dr. DiMaio from Rhode Island State and Johns Hopkins, and President Potter from Cornell. It is worth while calling attention to all this, for the cosmopolitanism of the medical profession has always been one of its strong virtues. It seems to some of us that there is a tendency nowadays to stress the importance of having schools cater to their local product. The well-known schools of this part of the country, at least, have gone far afield looking for top-quality students and they have distinctly tried to avoid provincialism.

The two clinical discussors were exceptionally good, for as President Potter pointed out, the intensity and wide awakeness of the audience which he could view from where he was, testified to this. As is well known, the most important part of a CPC is not the guessing of the right diagnosis, but the

logical treatment of the case even though logic is bound to fall down at times as it did this time. Right here might be interposed a criticism, whether just or not, of the up-to-date Clinical-Pathological Conferences. The motto of the remarkable men who are usually chosen for discussors nowadays is "The obvious is seldom so." If you will study the Cabot case reports in the NEW ENGLAND JOURNAL OF MEDICINE, you will find that the discussors refuse practically always to accept what seems to be staring them in the face. The diagnoses always are such as Dr. Osler forty years ago certainly never heard of, and we must admit that they usually seem to come out right.

If a case really was a chronic appendiceal abscess, however, we have a feeling that it would presumably be diagnosed as Schmellbusch's renal-neoplasm of which only two cases have appeared in the literature, both reported by Herr Schmellbusch.

Presumably obvious cases that really turn out to be so are screened out by the general practitioners and the outstanding specialists have their work pretty well confined to the bizarre cases.

The pathological summing up by Dr. Jacob Dyckman of the Miriam Hospital was beautifully illustrated with many colored slides.

It was a high grade meeting.

DENTAL CARIES

An interesting study of the prevalence of dental caries in primary and permanent teeth, based on a survey of close to nine thousand school children in Providence is published in this issue of the JOURNAL. Research studies of local conditions are too rare these days, and therefore we welcome to our columns Doctor Clune's excellent report.

The fluoridation of water supplies has probably created the impression with many people that the dental caries problem is automatically checked, and even eliminated to a great extent. Doctor Clune clearly emphasizes that however bright the dental future because of fluoridation, the treatment of water supplies is no complete answer or cure-all for dental caries elimination.

At its recent national meeting the American Dental Association sounded its warning again that one of the greatest contributors to unsound teeth is the excessive use of sugar products, whether they are candies or sweetened tonic, that are sold too freely everywhere, and in particular in schools where education should be carried out more effectively through controlled sales or elimination of sales to children at lunch hours.

Advertising to popularize treated toothpastes has probably stimulated to some extent the daily routine of the brushing of teeth, even though the treated pastes do not do all the wonderful things the advertisements predict for them. Fluoridation of drinking water presumably will have a long range effect upon the teeth of growing children. But worth while as these adjuncts may be, Doctor Clune's admonitions for combatting dental caries bear repetition: 1) practice good daily oral hygiene, 2) visit the dentist regularly for periodic checkup, 3) eat a properly balanced diet, 4) be moderate, or better still, curtail sharply the use of refined carbohydrates, candies and sweetened carbonated beverages.

CHEMICALLY CONTAMINATED FOODS

In this issue of the JOURNAL appears a very interesting review by the chairman of the Society's committee on industrial health on the subject of chemical contamination of foods through the use of pesticides. To anyone but a Rhode Islander a report on the toxic actions of pesticides on vegetables, animals and other phases of growing life by a committee on industrial health must seem rather incongruous. But we hasten to point out that our State is more than 90% urban, thus eliminating the need for a rural health committee; hence the very active industrial health organization was called into action.

The report should be read by every member of the Society. It is probably one of the first state medical society reports on this problem. No effort is made to render an all-inconclusive study of what is indeed a complex question. But the review is well developed.

Research will undoubtedly evoke much discussion in the coming years of the biological imbalances created by the spraying methods with pesticides. In man's eagerness to cure one evil he very often creates other troubles equally vexing, thus in destroying certain pests with new spray methods we kill many beneficial insects at the same time.

The greater problem of poison residuals on edible portions of vegetables and fruits presents a challenge, as our committee's report clearly indicates.

AVAILABLE TO EVERYONE

The direct enrollment campaign of Physicians Service and Blue Cross this month marks another step forward in the voluntary health insurance programs that no other plan, to our immediate knowledge, has yet taken. This month our Physicians Service was made available to any citizen, regardless of age, and regardless of whether he is employed or unemployed.

Until this year the administrative policy had been that an employed person must enroll through his place of employment. This provision, necessary in order to facilitate enrollment at the lowest possible

continued on next page

cost to both the subscriber and the corporation, prevented some persons from joining the plan. This situation occurred most frequently where sufficient employees in an industrial concern would not form a group membership, thus penalizing the worker willing to purchase the health insurance coverage at any reasonable cost.

This month anyone may join during the two week campaign, paying the individual enrollee's rate which is slightly higher than the group rate. Thus the last barrier to membership in Physicians Service and Blue Cross is lowered, and we feel certain that our action will be rewarded by the continued confidence of Rhode Island people in our programs.

PARTING OF THE WAYS

The action of the Connecticut Blue Cross in terminating its joint operations agreement with Connecticut Medical Service comes as a surprise to us as the tremendous development of these programs in recent years appeared to indicate complete accord in operative procedures.

As reported in the Connecticut Medical Journal last month, however, a few months ago "those who were close to the affairs of the two corporations sensed that serious differences of opinion were developing." The issue was finally brought to a climax when Connecticut Medical Service proposed to extend its contract to cover radiological diagnostic services in the physicians' offices at a slight premium increase. Efforts to develop the program through the Joint Policy Committee of the corporations were of no avail and Blue Cross declined to aid the medical service in publicizing and promoting the proposed added benefit on the grounds that the premium increase "might jeopardize the acceptability of the combined coverage."

Then followed notice by the Blue Cross that it would terminate its agreement within ninety days. All efforts at reconciliation proved fruitless, as the Blue Cross board of directors backed up its executive committee. One possibility for support of the action by the Blue Cross board as advanced by the Connecticut Medical Journal is the fact that the board of thirty-five members consists mainly of representatives of industrial corporations that employ large numbers of people, and these corporations now paying the major cost of the insurance were not anxious to support a premium rate increase.

If this viewpoint is well taken it certainly would indicate poor reasoning on the part of such industrialists, for the extension of hospitalization and medical service plans is inevitable, and as new benefits desirable from the worker's point of view are made available the cost must be met either by joint contributions or, as is often the case, by management on the basis of union-arbitrated contracts.

The immediate reaction in Connecticut, to our best knowledge, has not been unfavorable to the Medical Service plan's decision to carry on its extended program under its own management. Certainly no contract cancellations will result, and an orderly transfer of records is now underway. With several years of experience to aid its staff, Connecticut Medical Service will be in a favorable position to render even greater service to the people of that State.

Relations between our own Physicians Service and Blue Cross in Rhode Island have been most pleasant in the past few years. But there is no question that the joint operations arrangement, similar in many respects to the one in Connecticut, should be drastically revised that the experience of our neighboring state may never have to be duplicated here.

PREVALENCE OF DENTAL CARIES

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The N.N.R. monograph on Furadantin states:

"**Nitrofurantoin.—Furadantin (Eaton).—**

Actions and Uses.—Nitrofurantoin, a nitrofuran derivative, exhibits a wide spectrum of antibacterial activity against both gram-positive and gram-negative micro-organisms. It is bacteriostatic and may be bactericidal to the majority of strains of Escherichia coli, Micrococcus (Staphylococcus) pyogenes albus and aureus, Streptococcus pyogenes, Aerobacter aerogenes, and Paracolobactrum species. The drug is less effective against Proteus vulgaris, Pseudomonas aeruginosa, Alcaligenes faecalis, and Corynebacterium species; many strains of these organisms may be resistant to it. However, bacterial resistance to other anti-infective agents is not usually accompanied by increase in resistance of the organisms to nitrofurantoin. The drug does not inhibit fungi or viruses.

Nitrofurantoin is useful by oral administration for the treatment of bacterial infections of the urinary tract and is indicated in pyelonephritis, pyelitis, and cystitis caused by bacteria sensitive to the drug. It is not intended to replace surgery when mechanical obstruction or stasis is present. Following oral administration, approximately 40% is excreted unchanged in the urine. The remainder is apparently catabolized by various body tissues into inactive, brownish compounds that may tint the urine. Only negligible amounts of the drug are recovered from the feces. Urinary excretion is sufficiently rapid to require administration of the drug at four to six hour intervals to maintain antibacterial concentration. The low oral dosage necessary to maintain an effective urinary concentration is not associated with detectable blood levels. The high solubility of nitrofurantoin, even in acid urine, and the low dosage required diminish the likelihood of crystalluria.

Nitrofurantoin has a low toxicity. With oral administration it occasionally produces nausea and emesis; however, these reactions may be obviated by slight reduction in dosage. An occasional case of sensitization has been noted, consisting of a diffuse erythematous maculopapular eruption of the skin. This has been readily controlled by discontinuing administration of the drug. Animal studies, using large doses administered over a prolonged period, have revealed a decrease in the maturation of spermatozoa, but this effect is reversible following discontinuance of the drug. Until more is known concerning its long-term effects, blood cell studies should be made during therapy. Frequent or prolonged treatment is not advised until the drug has received more widespread study. It is otherwise contraindicated in the presence of anuria, oliguria, or severe renal damage.

Dosage.—Nitrofurantoin is administered orally in an average total daily dosage of 5 to 8 mg. per kilogram (2.2 to 3.6 mg. per pound) of body weight. One-fourth of this amount is administered four times daily—with each meal and with food at bedtime to prevent or minimize nausea. For refractory infections such as Proteus and Pseudomonas species, total daily dosage may be increased to a maximum of 10 mg. per kilogram (4.5 mg. per pound) of body weight. If nausea is severe, the dosage may be reduced. Medication should be continued for at least three days after sterility of the urine is achieved."

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TOXIC ACTIONS OF PESTICIDES

A Report to the House of Delegates of the Rhode Island Medical Society

BY STANLEY SPRAGUE, M.D.

Chairman of the Committee on Industrial Health . . . . September 30, 1953

ON AUGUST 20, 1952, a letter was received by the Editor of the RHODE ISLAND MEDICAL JOURNAL from a member of the Society requesting investigating action as to the "present extent of chemically contaminated foods and a report from time to time to the Society." The Council of the Society referred this letter for action by the Industrial Health Committee in September, 1952. Since then material is still being collected in reference to pesticides in their various forms.

There is no doubt from the literature so far reviewed that there are many and varying actions on the human system by certain applications of these various pesticides. Let it be stated now that the word "pesticides" will cover all types of insecticides and rodenticides.

The total value of the use of these pesticides on vegetables, corn, cotton, grasshopper control, forest conservation, cattle, hogs, chickens, and various other phases of growing life, are tremendous in economic fields, and will continue to play a very important part in our general overall life.

A summary of major toxic actions of insecticides interpreted in terms of human toxicology is appended to this report as Table I. A listing by titles of clinical memoranda on economic poisons is attached to this report as Table II.

To go into the total data regarding the toxic effects of these pesticides would be entirely beyond the scope of this report, but all data so far accumulated by your chairman will be filed at the Medical Library for reference by any member of the Society.

There have been some three hundred seventy cases of illness or dermatitis and fourteen deaths reported due to DDT assembled by the Committee on Pesticides of the American Medical Association. The authority states "it must be emphasized, however, that these reported cases were neither investigated nor confirmed, and most of them (285) were due to accidental or intentional ingestion of the chemical." There have been several deaths by formulators or operators of the highly poisonous phosphorus insecticides, such as Parathion or TEPP. The same authority also states that there were twelve persons who died in 1949 from ingestion of furniture polish, and 31,731 persons killed in automobile accidents last year, but, as the authority goes on to state, "we do not stop polishing furniture or using automobiles."

The basic necessities of life without the use of pesticides would be definitely jeopardized. For instance, there would be tremendous shortages in cabbage, beans, potatoes, apples, peaches, and other fruits; shortage of cotton and feed, and fiber; shortage of meat, as well as timber and paper. The ultimate value to human life by the use of pesticides greatly overshadows the danger of life by their use. Estimated losses in food products in this country due to insects is about four billion a year; due to rodents about one billion; destruction in food by house rats, four hundred million a year. These figures do not include damage to buildings, equipment, and other materials or disease and maintenance costs notably increased by the presence of harmful insects and rodents. This in itself is certainly a tremendous financial burden to all people so affected.

For instance in an annual apple crop before the use of DDT the loss due to coddling moths amounted to 15% of the crop value, and now only amounts to only 3 or 4%. The use of pesticides to control grasshoppers produces a savings of $55.00 for each control dollar spent. In wheat acreage, the use of pesticides resulted in an increase of four bushels per acre, which meant a profit of five million dollars to the farmers, and this profit reduced by approximately 1½ million to make the application with a net of nearly four million obtained.

Similar data might be compiled throughout all our agricultural sections of the country. Not only in agriculture, but proper control and use of pesticides on cattle, hogs, and sheep are also of the same untold value.

From a health standpoint, with which this report is concerned, consideration of the individual citizen is of paramount importance. Therefore the stress of advice and information should be to the medical profession generally that sanitation, both of the individual and of the locale in which he is working, as well as every possible preventive measure for the protection of the individual during the time that a pesticide is being used, is vital. Secondly, the clear understanding of the resultant effects

continued on page 668

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TOXIC ACTIONS OF PESTICIDES

continued from page 666

of such pesticides on the consuming citizen (that is, the person who actually ingests the fruit or vegetable which has been subjected to pesticide control) should be of a definite clarity as to symptomatology which the varying pesticides may produce, with an equal clarity as to the antidotes and controlling drugs when such cases of poisoning are encountered.

As a part of this report Table III is submitted to present a brief comparison of the hazards in connection with the use of common pesticides.

The following comment from the MONTHLY REVIEW of the Division of Industrial Hygiene and Safety Standards of the New York Department of Labor, warrants reprinting as part of this report:

"As to the method of application of insecticides, fumigation and spraying appear to be the most hazardous to the operator. This is due to the fact that the poison either as gas or vapor or in a fine state of subdivision as dust, mist or fume is readily accessible to the tissue of the lungs and from that rapidly to the blood and other vital organs. The best protection for this procedure is either mechanical ventilation or air line respirators. Mechanical exhaust ventilation cannot often be installed for reasons other than that it is quite expensive. In rooms for example where maximum concentration of poison is desirable the ventilating machines will work adversely since they will dilute the material. Remote control may be the solution in these cases. The room or building is to be hermetically sealed and the spray or gas pumped into it through a hole which is plugged after the operation is completed. Of course adjoining rooms must be vacated since there is always the possibility of leakage and seepage. The final cleaning of detoxification of the room should be done with the aid of a mechanical ventilation machine blowing or exhausting or a combination of both. The best protection for the operator who must enter the premises is an air line respirator which brings fresh air continuously and appropriate protective clothing. A man should not work alone but should be accompanied by another since unpleasant incidents cannot always be foreseen. An approved cannister mask, or cartridge

TABLE I

Summary of major toxic actions of insecticides interpreted in terms of human toxicology

Compound	*Local Effect*	*Predominant Symptoms*	*Estimated Fatal Dose*	*Period*	*Treatment*
			grams		
Rotenone	Irritation	Stupor, frequent convulsions, respiratory depression, death	200	2-3 days	General and symptomatic
Pyrethrines	None	Incoordination, tremors, muscular and respiratory paralysis, death	100	3-5 days	General and symptomatic
Nicotine	Irritation	Tremors, convulsions, curare-like paralysis, death	0.060	Minutes	General—artificial respiration
Lethanes	Irritation	Deep depression, cyanosis, dyspnea, tonic convulsions, respiratory paralysis, death	28.70 of concentrates	Within 12 hrs.	General and symptomatic
DDT	None	Giddiness, nervous tension, involuntary muscular tremors, convulsions, depression, respiratory failure, death	30	2-24 hours	General; Phenobarbital
Methoxychlor	Slight Irritation	Questionable tremors, depression	450	2-4 days	General and symptomatic
Chlordane	Irritation	Convulsions, depression repeated several times, deep depression, death	5-60	1-4 days	General and symptomatic
Toxaphene	Irritation	Epileptiform convulsions and death	7	4-24 hours	General; Phenobarbital
Organic Phosphates	Irritation	Lacrimation, salivation, sweating, nausea, vomiting, diarrhea, respiratory distress, disturbance of vision, headache, muscular tremors, generalized collapse, death	0.012	1-4 hrs.	General and symptomatic; Atropine; Magnesium Sulfate
TDE	Slight Irritation	Lethargy	300	1-4 days	
Benzene Hexachloride	Irritation	Hyperirritability to outside stimulus, occasionally convulsions, depression, death	30	1-5 days	General and symptomatic

TABLE II

Clinical Memoranda on Economic Poisons

Titles which are italicized are arranged alphabetically in the Memorandum)

Introduction
Aldrin see the closely related compounds chlordan and dieldrin)
Benzene hexachloride
BHC (see benzene hexachloride)
Chlordan
Chlordane (see chlordan)
Chlorinated camphene (see toxaphene)
Clinical tests—general suggestions (see introduction p. 4)
Coal oil (see kerosene)
Compound 42 (see warfarin)
Compound 497 (see dieldrin)
Compound 3422 (see parathion)
Compound 3956 (see toxaphene)
DDT
Deobase (see kerosene)
Dieldrin
Dilan
Dimethylbenzene (see xylene)
E-605 (see parathion)
E-1059 (see Systox)
Gammexane (see benzene hexachloride)
Gesarol (see DDT)
Kerosene
Lindane (see benzene hexachloride)
Neocid (see DDT)
Niran (see parathion)
Octa-Klor (see chlordan)
Octalox (see dieldrin)
Parathion
Prolan-bulan mixture (see Dilan)
666 (see benzene hexachloride)
Sodium Fluoroacetate
Sodium monofluoroacetate (see sodium fluoracetate)
Systox
Ten eighty (see sodium fluoracetate)
1080 (see sodium fluoroacetate)
Thiophos (see parathion)
TEPP (see tetraethyl pyrophosphate)
Tetraethyl pyrophosphate
(see also parathion)
Toxaphene
Treatment—general suggestions (see introduction P. 6)
Felsicol 1068 (see chlordan)
Warfarin
WARF-42 (see warfarin)
Xylene
Xylol (see xylene)

Technical Development Laboratories
Technology Branch
Communicable Disease Center
U.S. Public Health Service
P.O. Box 769
Savannah, Georgia

TABLE III

DDT

Potential hazard of DDT may have been underestimated because

continued on next page

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a. At very low levels of feeding there is
   1. Storage
   2. Definite though minimal liver damage
b. Elimination is slow
c. Milk can become contaminated as the result of barn spraying
d. Has been found in human milk
e. Is deposited in human fat

Chlordane

Presents the greatest all-around hazards of the commonly used chlorinated insecticides and therefore
a. Has no place as a contaminant of foods
b. Household use should be strictly limited

Lindane

Has about ¼ the hazard of DDT because of
a. Minimal storage
b. Rapid elimination
c. Less tissue damage

Toxaphene

Lack of adequate method for microdetermination in biological material handicaps final appraisal.

Methoxychlor

One of the safest of insecticides because of
a. Little or no effects at high levels of chronic feeding
b. Little or no storage in fat

Dieldrin

About 10 times more poisonous by dermal than by oral route. Chronic effects not known at present but appear to be like chlordane.

Aldrin

Same as for dieldrin

Rotenone

Chronic effects appear to be less than first anticipated; residue hazard may be less.

Pyrethrins

Among the safest of insecticides. Toxicological hazards under conditions of use extremely remote.

Allethrin

Evidence at present indicates similar toxicity to that of pyrethrins.

Piperonyl butoxide, N-propyl isome, Octacide 264

These activators have such a low order of toxicity as to be considered as presenting little or no hazard under ordinary conditions of use.

Few cases of poisoning — Although there are few authentic cases of any ill effects from the use of insecticides as recommended by Federal and State authorities, there are a number of reports of illness and a few deaths chargeable to the pesticides. Careful checks on men who have worked extensively with the newer insecticides, such as DDT, have not disclosed any evidence of chronic poisoning but this possibility through careless exposure should not be lost sight of. Many reports of ill effects have proved erroneous, but it is our responsibility to reduce, by example and teaching, cases of accidental poisoning by pesticides, and thus remove any basis for criticism.

respirator may be used only under special circumstances and for a limited time only.

"The painting or depositing of poison though not as dangerous as gassing, vaporizing or spraying is still hazardous. Many insecticides are readily absorbed through the skin. When handling them, impervious gloves such as those made of neoprene dipped cotton should be used. The workers should change their clothes completely and bathe with soap

and water after using the material. The compounds except parathion and nicotine are as a rule, more dangerous to handle when in solution than when in wettable powder or dust form. Many compounds are only slightly irritating and when used are apt to give the operator a false sense of security. Repeated exposures often increase the hazard many times more than that of a single exposure. In fact chronic exposures to small doses of poison may not be so dramatic and the results not so obvious. Yet the toxicity is no less real but often insidious and the damage becomes apparent when it is altogether too late.

"The health hazards, though grave, however, do not outweigh the beneficial value of insecticides and rodenticides. With proper precautions and intelligent application it should by no means be difficult to use these agents safely and keep them functioning at its greatest efficiency as insecticides and rodenticides."

The main danger from pesticides appears to be from three main sources:

(a) *Direct ingestion (usually accidental)*

(b) *Inhalation of the vapors*

(c) *Direct application on the skin.* These are usually the very serious and fatal cases. There is however, a form of chronic toxic action by these pesticides on those who use them which produces over a period of time, definite depositions of the poison in the subcontanious fat of the body, repeated respiratory distress, and possibly liver and kidney damage. Some pesticides appear to have a greater body storage propensity than others and the greater this propensity the greater is the ability of the pesticide to injure tissue. It is certain that from a medical standpoint the storage of a pesticide in fat or other tissue cannot be dismissed lightly.

Many field tests followed by careful chemical analyses have, however, made this particular conclusion, especially in regard to the use of one of the most commonly used pesticides, namely DDT, that no edible portions of the crops indicated any absorption or translocation of the DDT by the vegetable material. This is also reported to hold as to fruit and other edible "above the ground" foods.

The data submitted by your chairman covers a period which follows the development and use of pesticides from 1949 to the middle of 1953.

Respectfully submitted,

STANLEY SPRAGUE, M.D., *Chairman*
Committee on Industrial Health

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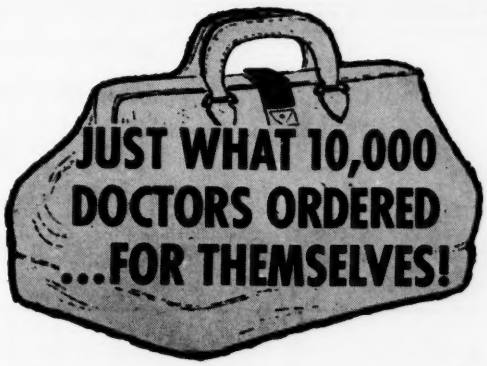

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HOUSE OF DELEGATES

of the

RHODE ISLAND MEDICAL SOCIETY

Report of meeting held September 30, 1953

A MEETING of the House of Delegates of the Rhode Island Medical Society was held at the Medical Library on Wednesday, September 30, 1953. The meeting was called to order by the President, Dr. Earl F. Kelly, at 8:15 p.m.

The following delegates were in attendance:

KENT COUNTY—Peter C. Erinakes; *NEWPORT COUNTY*—Frank J. Logler; *WOONSOCKET DISTRICT*—Alfred E. King; *PAWTUCKET COUNTY*—Edwin F. Lovering, Henry E. Turner, Howard M. Umstead, Harold A. Woodcome; *PROVIDENCE*—Frederic J. Burns, Wilfred I. Carney, Francis H. Chaffee, William B. Cohen, Michael DiMaio, William J. H. Fischer, J. Merrill Gibson, Hannibal Hamlin, Robert G. Murphy, William S. Nerone, Alfred L. Potter, William A. Reid, Louis A. Sage, Lee G. Sannella, William J. Schwab, George W. Waterman; *Officers of the RIMS*—Earl F. Kelly, Henri E. Gauthier, Herbert E. Harris, Thomas Perry, Jr.; *Delegate to the AMA*—Charles L. Farrell.

Also in attendance were Dr. Stanley Sprague, Chairman of the Committee on Industrial Health, and John E. Farrell, Sc.D., Executive Secretary.

REPORT OF THE SECRETARY

Dr. Thomas Perry, Jr., Secretary, read his report, a copy of which had been submitted to each member of the House, as follows:

Since the last meeting of the House of Delegates two meetings have been held by the Council. Business transacted by the Council included the following:

1. The Trustees of the Fiske Fund voted to offer a prize of $250 for the best essay in 1953 to be submitted on the subject: "Recent Advances in Cardiac Surgery."
2. Upon invitation the Council voted to enroll the Society as a member of the National Society for Medical Research.
3. The Council unanimously voted that a suitable marker be placed on the reading table in the Medical Library used by Dr. Herbert G. Partridge to express the Society's appreciation of his long service in the interests of the Library.
4. Communications relative to professional liability insurance addressed to the Society by the Aetna Insurance Company were referred to the Health Insurance Committee for a study of the problem of increasing costs of liability insurance.
5. The Trustees of the Medical Library were authorized to convert the heating equipment at the Library to allow for the use of oil instead of coal.
6. The Council voted that the national and the local Blue Cross organizations be informed of its objection to the offering of free diet guides without medical approval, as advertised in the Blue Cross Commission's publication *Blue Print for Health.*
7. The Council moved that the Society approve the present operation of the State Diagnostic Clinic for Retarded Children, and that the State Department of Social Welfare be notified that the Council is of the opinion that its Child Health Relations Committee should be utilized as an official advisory committee to this Clinic.
8. The President was authorized to appoint a committee on veterans affairs.
9. The Council approved of the Society's membership in the Council of the New England State Medical Societies for the year 1953-54, and of Drs. Earl F. Kelly, Thomas Perry, Jr., and Albert H. Jackvony as the official delegates to the Council for this year.
10. The President was authorized to appoint delegates to attend a meeting in Boston to be conducted by the Recess Commission (of the Massachusetts General Assembly) on the University of Massachusetts Medical and Dental School to explore the idea of a New England regional plan for the promotion of increased medical and dental training.
11. The Council reviewed and approved the report of the Treasurer relative to the budget for the Society for the year 1954.
12. It was voted by the Council to defer action of a proposal for a Medical Assistants Society.

continued on page 674

Major advance in dermatitis control:

The new direct approach to the control of dermatitides is hormonal, enlisting the antiphlogistic and antiallergic potency of compound F—foremost of the corticosteroid hormones.

The new objective is adapting corticoid therapy to simple inunction treatment, and obtaining relief in various forms of dermatitides within days —sometimes within hours.

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HOUSE OF DELEGATES

continued from page 672

13. The Committee on Chronic Illness of the Society was requested to review and report to the Council on the recent study on Old Age in Rhode Island by a Commission appointed by the Governor.

Action—It was moved that the report of the Secretary be approved and placed on file. The motion was seconded and adopted.

Recommendation from the Council

The Secretary reported that the Council recommended that the proposed budget submitted to the Council by the Treasurer for the year 1954 be approved, and that the annual assessment be $40 for active members in good standing, except that members in their first year of practice shall be assessed annual dues of $25.

Action—It was moved that the recommendations of the Council be adopted. There was brief discussion of the motion. The motion was seconded, and adopted.

Report of the Treasurer

In the absence of Dr. John A. Dillon, Treasurer of the Society, his report was submitted by the Secretary, as follows:

"In accordance with the By-Laws of the Society, I have submitted to the Council a proposed budget for the Society for the year 1954, which it has approved.

"This proposed budget is necessarily predicated upon the experience of the past three years in the cost of operations of the Society's activities, and since there has been little change in recent years the expenditures anticipated, as well as the receipts estimated, parallel the budgets of the past three years.

"Our total expenditures in 1951 were $37,692.47. In 1952 the total was $36,943.43. Our 1953 budget, based on these experiences, was set at approximately $35,470. However, we have added an unexpected expense of new heating equipment for the Library building this summer, and this item will eliminate in all probability any net that we might have added to our limited reserves this year.

"The budget for 1954 calls for estimated expenditures of $36,930, and for estimated receipts of $37,775, leaving a margin of $845 between operating costs and the annual income.

"The estimated income includes anticipated dues based on an annual assessment of $40 for each active Fellow of the Society and $25 for each member in his first year of practice."

Action—It was moved that the report be approved and placed on file. The motion was seconded and adopted.

Communications

The Secretary reported the following communications:

1) From Dr. Laurence A. Senseman, Medical Director of the Rhode Island Chapter of the National Multiple Sclerosis Society, asking the opinion of the House relative to the Medical Committee of this Chapter.

Action—It was moved that the House of Delegates record its opinion that all medical committees of private and public health agencies should be composed of doctors of medicine.

The motion was seconded and adopted.

2) From the Rhode Island Chapter of the American Academy of Pediatrics expressing reasons for its approval of the State Diagnostic Clinic for Retarded Children.

Action—This opinion had been requested by the Council of the Society. No action was taken on the communication.

3) Dr. Earl F. Kelly, President, submitted a communication he had received from the commanding officer of the U S. Naval Air Station at Quonset requesting the assistance of the Society relative to the problem of sick leave absenteeism.

Action—The communication was discussed, and it was suggested that more detailed information as to how the Society's members might assist should be secured from the Air Station commander.

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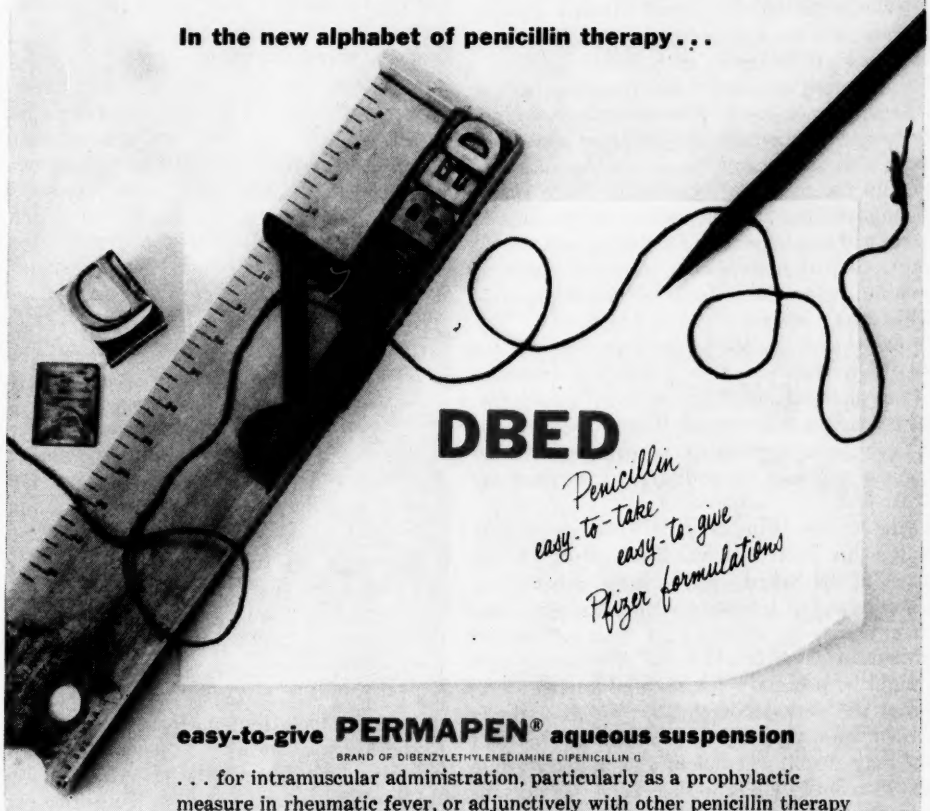
In the new alphabet of penicillin therapy . . .



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HOUSE OF DELEGATES

continued from page 674

Physicians Service

In the absence of Dr. Joseph C. O'Connell, President of the Rhode Island Medical Society Physicians Service, the Secretary read his report to the House of Delegates as follows:

"The reported enrollment in Physicians Service as of September 1 was 345,831 subscribers, and the total expense of operating the program was utilizing 96.5% of our income.

"Within the past few months the State Insurance Commissioner has determined that the sum of $300,000 will be adequate as a statutory reserve for the protection of subscribers. However, we must still continue to set aside funds each month to build up a maternity reserve.

"In order that the officers and members of the Board of Directors may have a clearer understanding of our financial obligations to Blue Cross for its administrative work carried forward under our Joint Operations Agreement, a cost analysis is being made of our joint expenditures by the company of Ernst & Ernst, accountants.

"At the request of the Board of Directors a study committee has been appointed, consisting of five members of the Board, to review the Schedule of Indemnities and to determine what additional benefits, if any, may be added in the near future, and to estimate any possible additional premium charges that might be necessary for such additions.

"From the period November 9 to 21 a direct enrollment campaign will be conducted. This year anyone may enroll, whether in an employee group or not. Previously the ruling has been that persons in an employee group must join with a group at the place of employment, and if the group did not form the membership was not available. Under our new plan no person in the State will be barred for this reason from joining Physicians Service during the direct enrollment campaign."

Action—It was moved that the report of the President of Physicians Service be received and placed on file. The motion was seconded and adopted.

Committee on Industrial Health

Dr. Stanley Sprague, Chairman of the Committee on Industrial Health, informed the House that a complete report had been submitted to it in writing relative to the Committee's investigation of the present extent of chemically contaminated foods from pesticides. He stated it was purely an informative report, and he requested that copies be sent to Dr. Howard Laskey of Carolina, who had requested that the Society investigate the problem.

The complete report of the Committee is made a part of the official minutes of the meeting.

Health Insurance Committee

Dr. Charles L. Farrell Chairman of the Health Insurance Committee, discussed the report that had been sent to the members of the House of Delegates by his Committee relative to multiple coverage in surgical-medical care plans.

He concluded his discussion of the report with the recommendations that copy of the report be sent to each member of the Society as an individual mailing, that the proposed "assignment to pay" form be printed and distributed to the members of the Society for their use in attaching the form to insurance claims, and that the instruction pages relative to insurance for medical services be printed in pad form for distribution to physicians for the education of their patients regarding insurance coverage for physicians' services.

Action — The report was discussed at some length, after which the following action was taken.

It was moved that the House table the recommendation to send the complete report to each member of the Society until further information on the problem is compiled at a later date. The motion was seconded and adopted.

* * *

It was moved that the proposed "authorization for direct payment" be printed on stickers and distributed in quantity to each member of the Society for use on claim forms submitted to insurance companies. The motion was seconded and adopted.

* * *

It was moved that the Health Insurance Committee's explanation of "Insurance for Medical Services," as amended, be printed and distributed in quantity to each member of the Society, together with the "authorization for direct payment" forms. The motion was seconded and adopted.

Cancer Committee

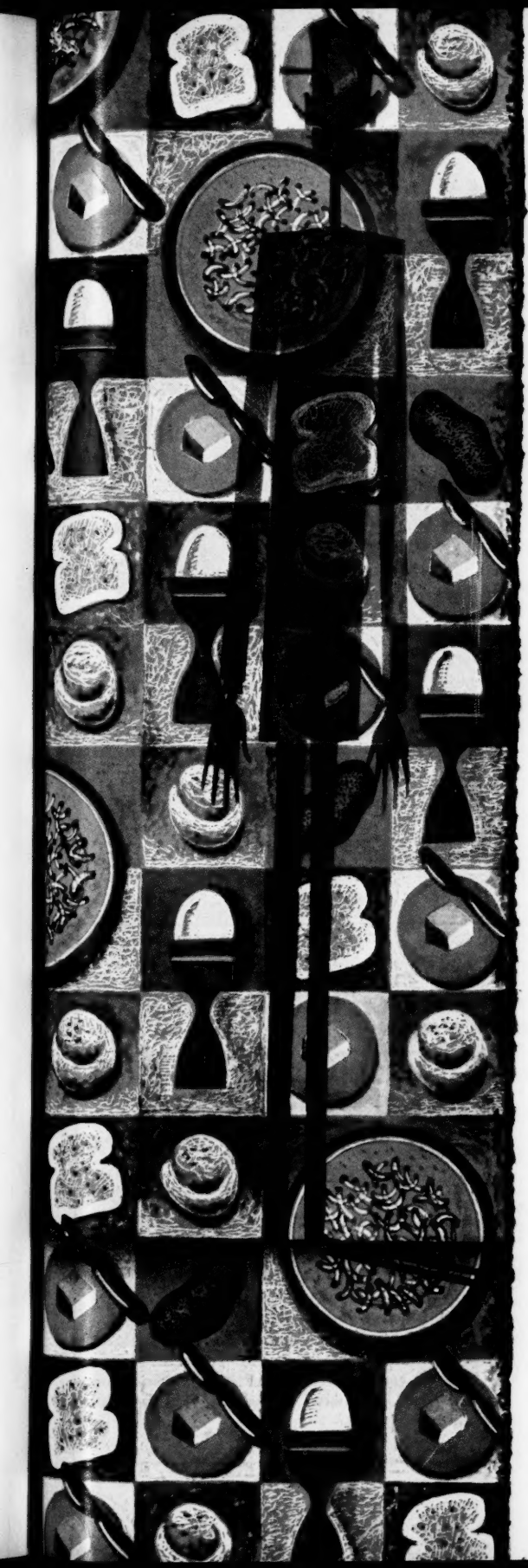
Dr. George Waterman, Chairman of the Cancer Committee, reported briefly regarding the plans for the 6th Annual Cancer Conference for Physicians to be held at the Miriam Hospital on October 14.

He also stated that the Committee looks forward to an expanded state program with greater coordination with the three agencies interested in cancer control. He stated that with the appointment of Dr. Thomas Murphy as Director of the State Division of Cancer Control the Committee anticipated a more active program in the coming months.

Committee on Diabetes

In the absence of Dr. Louis I. Kramer, Chairman of the Committee on Diabetes, the President of the Society reported briefly on the plans for the Diabetes Fair, and also for the Interim Meeting of the Society, at which the scientific lectures would be on phases of management of diabetes.

continued on page 678



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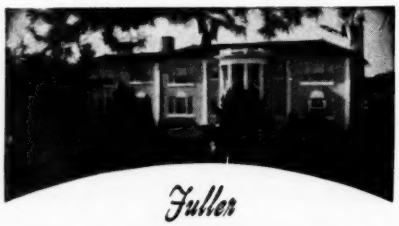

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HOUSE OF DELEGATES

concluded from page 676

Disaster Committee

Dr. J. Merrill Gibson, Chairman of the Committee on Disaster, reported that a civilian defense test would be held on October 25 in Providence.

He also cited as a problem warranting consideration the absence of physicians as supervisors at teaching classes on first aid. He expressed the opinion that if teachers in the schools are to be taught first aid programs, a medical supervisor should attend some of the meetings.

Association of American Physicians and Surgeons

Dr. Peter C. Erinakes reviewed the work of the Association of American Physicians and Surgeons, of which Dr. Charles L. Farrell, of Pawtucket, is currently the President. He expressed the opinion that the House might well approve the principles and objectives of this Association.

Action—He moved that the House of Delegates of the Rhode Island Medical Society approve the principles and objectives of the Association of American Physicians and Surgeons. The motion was seconded.

Dr. Charles L. Farrell reviewed the activities of the Association during the ten years of its existence.

The motion was adopted.

* * *

The meeting adjourned at 10:25 p.m.

Respectfully submitted,
THOMAS PERRY, JR., M.D., *Secretary*

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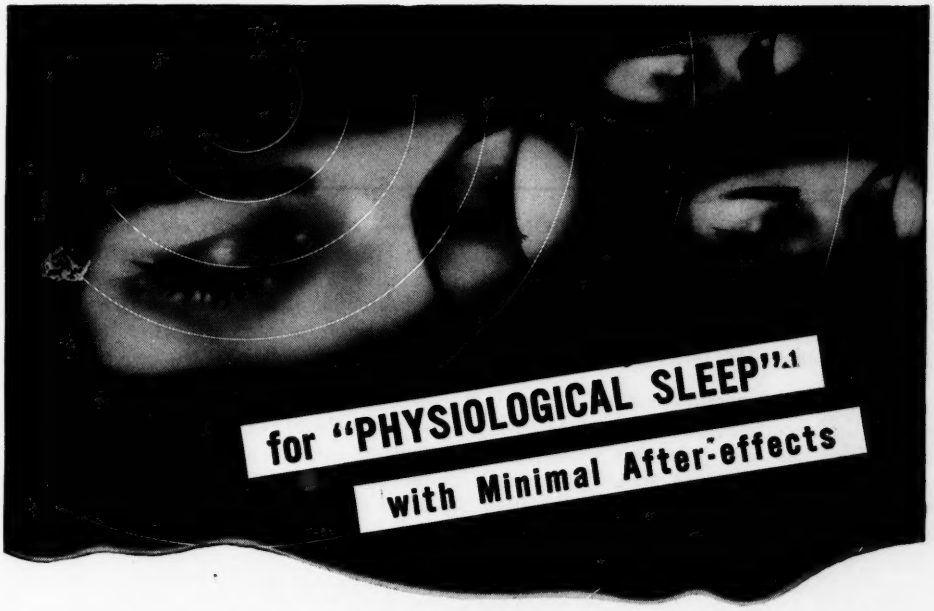

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[1]N.N.R., 1947, p. 398.
[2]Goodman, L. & Gilman, A., The Pharmacological Basis of Therapeutics. MacMillan, 1944, pp. 177-8.

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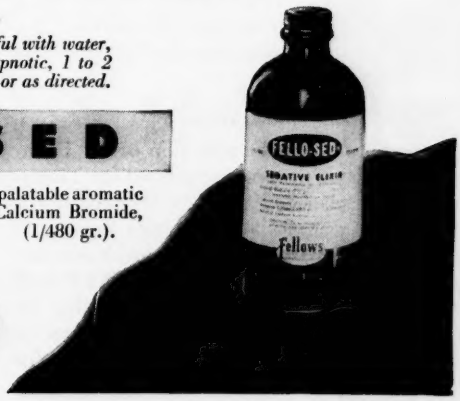

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DISTRICT MEDICAL SOCIETY MEETINGS

PROVIDENCE MEDICAL ASSOCIATION

A regular meeting of the Providence Medical Association was held at the Rhode Island Medical Society Library on Monday, October 5, 1953. The meeting was called to order by the President, Dr. Alfred L. Potter, at 8:35 p.m.

Minutes of Previous Meeting

The President reported that the minutes of the previous meeting had been printed in the RHODE ISLAND MEDICAL JOURNAL and, therefore, would not be read and would stand approved as printed unless any member had a correction to make in them. There were no amendments and the minutes were accepted as published.

Announcement by the President

The President announced that since the last meeting of the Association in April, the following members have died: Drs. Tancredi G. Granata, Hugh J. Hall, John F. Murphy, and Francis D. O'Connell.

He announced that he had named committees to prepare tributes as follows: Drs. Frederic J. Burns and Vincent J. Ryan to prepare the Association's tribute to the late Dr. Francis D. O'Connell; Drs. Russell R. Hunt and E. Victor Conrad to prepare the Association's tribute to the late Dr. Hugh J. Hall; Drs. Reginald A. Allen and Walter S. Jones to prepare a tribute to the late Dr. John F. Murphy; and Drs. Joseph Smith and Anthony Corvese to prepare the Association's tribute to the late Dr. Tancredi G. Granata. The President called for a moment of prayer for the deceased members of the Association, and all in attendance at the meeting stood for the tribute.

Communications

The Secretary called the attention of the members to the television program scheduled for Thursday evening, October 8, 1953 at 10:00 p.m. by the American Medical Association; Health Forums to be conducted by the Doctors' Guild of Providence College for the general public; the 6th Annual Cancer Conference for Physicians on October 14, 1953; the 6th Annual Dr. Isaac Gerber Oration scheduled for October 21, 1953; and the plans for the Providence Medical Association meeting on November 2, 1953.

Introduction by the President

Dr. Potter introduced Mr. Joseph F. Carey, representative of the A. H. Robins Co., Inc. of Richmond, Virginia, who was representing the company with a display of pharmaceuticals at the meeting. Mr. Carey spoke briefly on the products that he had on display in the Library.

Award of Membership Certificates

The President awarded a certificate of membership to Dr Michael G. Pierik who had been elected to active membership in the Association at the April meeting. In the absence of Dr. Betty Burkhardt Mathieu, the Secretary was instructed to forward her Certificate to her.

Report of the Executive Committee

Dr. Michael DiMaio reported that the Executive Committee recommended to the Association for active membership Drs. Ruth Appleton, John R. Bowen, Daniel G. Calenda, Erminio R. Cardi, Vito L. Coppa, Pedro M. Davila, Herbert Ebner, John E. Farley, Jr., Robert W. Hyde, Leland W. Jones, Valentin Klymenko, David J. LaFia, Robert E. Martin, Adolph J. Motta, Jr., Arthur E. O'Dea, Wesley F. Roberts, Leonard S. Sutton, and James K. C. Wang, and Dr. Richard Rice who transferred from the Newport County Medical Society. Dr. DiMaio also reported that the Executive Committee recommended to the Association for associate membership Dr. Joseph F. McNally.

The Secretary moved the adoption of the recommendations and the election of the applicants to the respective memberships. The motion was seconded and unanimously adopted.

Report of the Chairman of the Disaster Committee

Dr. J. Merrill Gibson, Chairman of the Association's Disaster Committee, briefly outlined plans for the Civilian Defense Test to be conducted in the City of Providence on Sunday, October 25, 1953. He reviewed the plans for the medical phases for the test, and he called upon the members of the Association to give active support to the Civilian Defense program.

Scientific Program

The President turned the scientific program over to Dr. Alex M. Burgess, Sr., who presided at a

continued on page 682

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*Adams, C. H., and Cecil, R. L.: Ann. Int. Med. *33*:163, 1950.

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PROVIDENCE MEDICAL ASSOCIATION

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clinical-pathological conference. Dr. Burgess is Area Chief in Medicine of the U.S. Veterans Administration at Boston, Massachusetts. Clinical discussors were Dr. Ivan L. Bennett, Jr., Assistant Professor of Medicine at Yale University Medical School and Dr. F. Dennette Adams, Assistant Clinical Professor of Medicine at Harvard Medical School and Physician at the Massachusetts General Hospital; the pathologist was Dr. Jacob Dyckman, Director of Laboratories at the Miriam Hospital in Providence.

A printed summary of the case was submitted to the membership.

Dr. Burgess presented the case and his presentation was followed by an excellent discussion by Drs. Bennett and Adams.

Dr. Dyckman presented the pathological material by lantern slides. The patient had polycythemia vera.

The meeting adjourned at 10:30 p.m.

Attendance was 154.

Collation was served.

Respectfully submitted,
MICHAEL DEMAIO, M.D., *Secretary*

TOXIC ACTIONS OF PESTICIDES

continued from page 671

Quar. E-698. Second Revision, February, 1953
Trans. 17th N. A. Wildlife Conf., March, 1952
U. S. Dept. Agri. Bur. of Ento. and Plant Quar. Pesticide Legis., Nat'l Cotton Control of America, Cotton Insect Control Conf., December 1952, Dr. Fred C. Bishopp
U. S. Dept. of Agric. Bur. Ento. and Plant Quar., October, 1950, House Fly Control, Dr. Fred C. Bishopp
U. S. Dept. Agric. Bur. Ento. and Plant Quar., Agricultural Chem., May, 1950, Dr. Fred C. Bishopp
U. S. Dept. Agric. Bur. Ento. and Plant Quar., Pest Control 1951. Dr. Fred C. Bishopp
U. S. Food and Drug Adm., A. J. Lehman, Chief. Chemicals in Foods, May 1951
U. S. Food and Drug Adm., A. J. Lehman, Chief. Pharm. Consid. of Insecticides, April, 1949
N. Y. State Dept. Labor., Div., Indust. Hyg., Insecticides and Rodenticides, B. H. Dolin, April 1952
Wasco-Sherman Pub. Health Dept. Ore. Harry H. Utes, M.P.H. Organic Phos. Insect. Indust. M. & S. Sept. 1953
A.M.A. Comm. on Pest. Council on Pharm. & Chem. Jour. A.M.A., July 7, 1951
J.A.M.A., March 10, 1951
J.A.M.A., March 10, 1951
J.A.M.A., Oct. 6, 1951
J.A.M.A., Sept. 9, 1950
J.A.M.A., April 1, 1950
J.A.M.A., May 24, 1952
J.A.M.A., May 24, 1952 pp 267, 269
J.A.M.A., July 19, 1952
J.A.M.A., July 25, 1953

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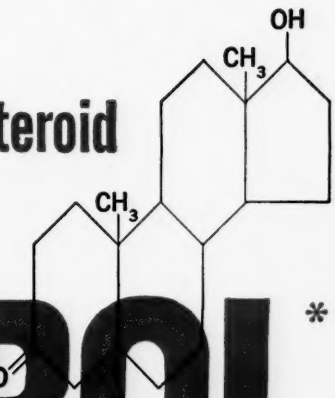

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THE WHISTLE has blown for the last quarter . . . the last quarter of 1953. The final score will be the total the American Medical Education Foundation can register for the nation's medical schools. Now is the time for a maximum effort on the part of every state to insure a record income for 1953. Physicians who have not contributed, but plan to do so before the end of December should send their donations to the Foundation at 535 North Dearborn street in Chicago. Remember, you can designate the school you wish to receive your contribution. This month you will receive literature and a letter explaining how you can do your part in this most worthy cause. Read it carefully.

THE EVIDENCE IS OVERWHELMING

In mid-October the House Interstate and Foreign Commerce Committee health hearings came to a halt after two days of testimony on the extent of health insurance coverage in the United States. The Committee had gathered so much material since it started its hearings on October 1 that time had come to stop and analyze it. Major insurance companies submitted evidence more than 91 million men, women and children now have hospitalization protection, 73 million have surgical expense coverage, and 36 million are protected for medical expense. Last year about 1 billion dollars was paid by voluntary health plans for hospitalization, 500 million dollars for surgical and doctors' bills, and another 500 million dollars in benefit payments to replace family income lost through sickness or injury.

CASH FOR A FERTILE MIND

The American Society for the Study of Sterility announces the opening of the 1954 contest for the most outstanding contribution to the subject of infertility and sterility. The winner will receive a cash award of one thousand dollars, and the essay will appear on the program of the 1954 meeting of the Society. Essays submitted in this competition must be received not later than March 1, 1954. For full particulars concerning requirements of this competition, address The American Society for the Study of Sterility, c/o Dr. Herbert H. Thomas, Secretary, 920 South 19th Street, Birmingham, Alabama.

The author should append on a separate sheet of paper a short biographical sketch of himself and include a photograph to be used in the necessary publicity should he be the winner of the award.

NO FEDERAL SOCIAL SECURITY FOR DENTISTS

The American Dental Association reiterated its opposition to the inclusion of dentists in the Old Age and Survivors Insurance program during its 94th annual session held in Cleveland last month. This marks the third time since 1949 that the ADA House of Delegates representing 70,000 dentists of the country has formally committed the dental profession against OASI.

We hope the dentists sent their forceful statement along to Washington, for Secretary Hobby forecasts prompt action in 1954 in the extension of OASI programs to ten and one-half million more persons, including physicians, dentists and many other groups of self-employed.

Meanwhile, a House Ways and Means subcommittee under the chairmanship of Representative Carl Curtis of Nebraska is continuing its study of the whole social security structure and will report to Congress after the first of the year.

Physicians and dentists would like a little faster action on the Jenkins-Keogh Plan, which would allow them and other self-employed persons to defer income tax payments on a portion of their income which would be put into restricted annuity programs. If this legislation could be cleared there would be little need for talk of extending the OASI program to such groups.

CONFERENCE CONSIDERS SCHOOL HEALTH PROBLEMS

The 4th national conference on Physicians and Schools, held at Highland Park, Illinois, last month laid the groundwork for further cooperative efforts of the medical profession, educators, public health workers and parents in solving school health problems. Highlights of the discussions carried on by various groups during the conference included: 1) the importance of adequate screening of candidates for teaching positions, 2) the need for a freer exchange of health information by schools, families and private doctors to assist the teacher in the

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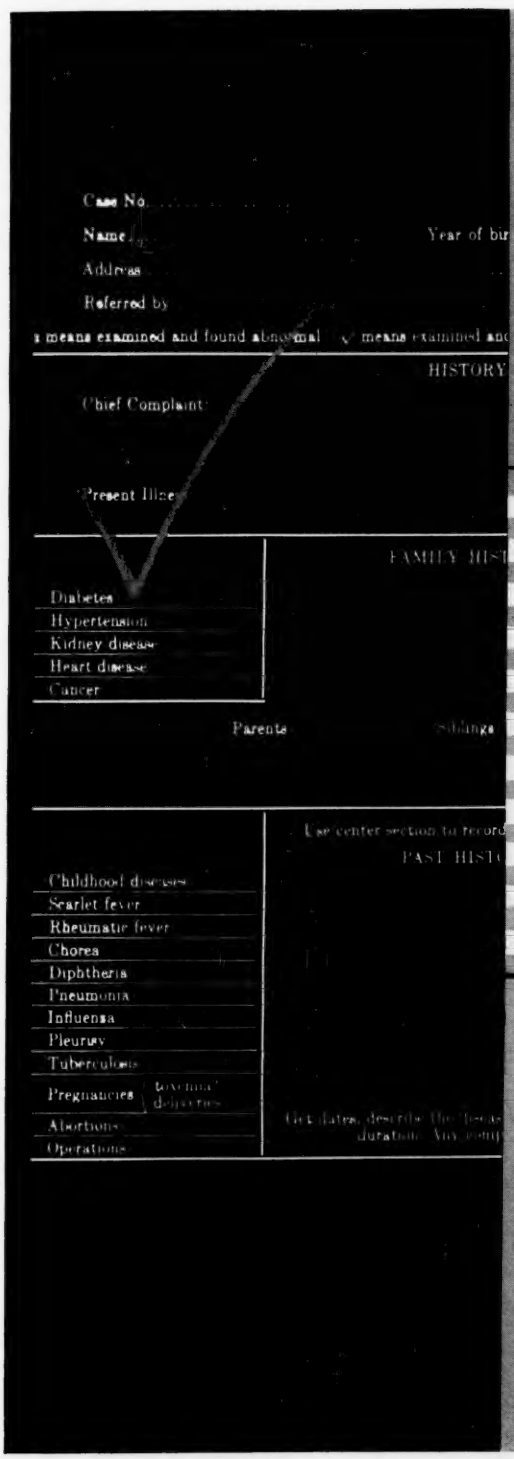

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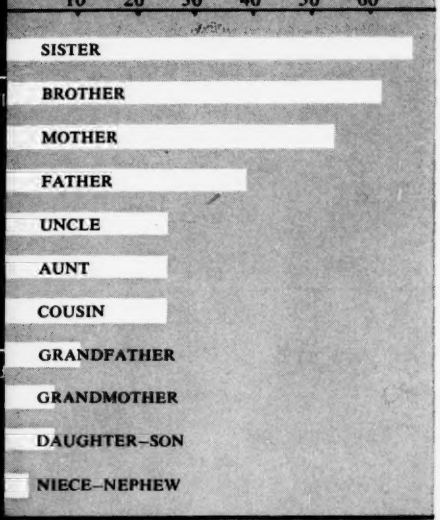

The Diabetic Relatives of 265 Diabetics[1]

In view of "...the very high incidence of...unsuspected cases among the blood relatives of diabetic patients,"[2] urine-sugar testing of all such individuals should be routine and frequent.

1. Barach, J. H.: Diabetes and Its Treatment, New York, Oxford University Press, 1949, p. 38.
2. Allen, F. M.: Diabetes Mellitus, in Piersol, G. M., and Bortz, E. L.: Cyclopedia of Medicine, Surgery, Specialties, Philadelphia, F. A. Davis Company, 1951, vol. 4, p. 505.

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THROUGH THE MICROSCOPE

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proper management of pupils; 3) health examinations should not be done on a mass basis, 4) criteria should be established to raise standards for selection of teachers, since teachers strongly affect the mental and emotional health of children, hence they should be thoroughly adjusted persons themselves, 5) medical examination should precede participation in vigorous school sports activities, and a physician should be present at all contests where the accident hazard is pronounced, 6) medical societies should have active health committees to coordinate the efforts of the profession in the promotion of the health of the school child, and 7) maintenance of good health records is vital to the provision of sound health services.

FLORIDA IN THE WINTER

While no true New Englander will admit that there is any good reason to leave the confines of this glorious region during the invigorating months of January and February, we find an exception in the notice that the 8th annual University of Florida Midwinter Seminar in Ophthalmology and Otolaryngology to be held at Miami Beach the week of January 18. For further information write to Dr. Shaler Richardson, 111 W. Adams Street, Jacksonville.

TELEVISION PROGRAMS FOR THE PHYSICIAN

The American Cancer Society's Massachusetts Division has announced a special series of 30 color television programs, covering broad aspects of cancer detection, diagnosis and treatment, to be shown on Wednesdays at the Children's Cancer Research Center, 35 Binney street, (one block from the Children's Hospital), from 5 to 6 P.M. The programs are carried on a closed circuit and will originate from New York's Memorial Center, and from the Francis Delafield Hospital.

We hope you saw the "March of Medicine" TV programs on October 8 and November 5 over WJAR-TV. Look for the next program on December 3 showing highlights of the AMA's annual clinical session in St. Louis.

MALPRACTICE INSURANCE IN NEW YORK

The malpractice insurance and defense board of the New York State Medical Society has served notice on physicians of the Empire State that the new basic rates for $5000/$15,000 limits, effective September 1, would be $80 for non-surgical and $175 for surgical, in the Metropolitan area, and $45 for nonsurgical and $100 for surgical in the upstate regions..

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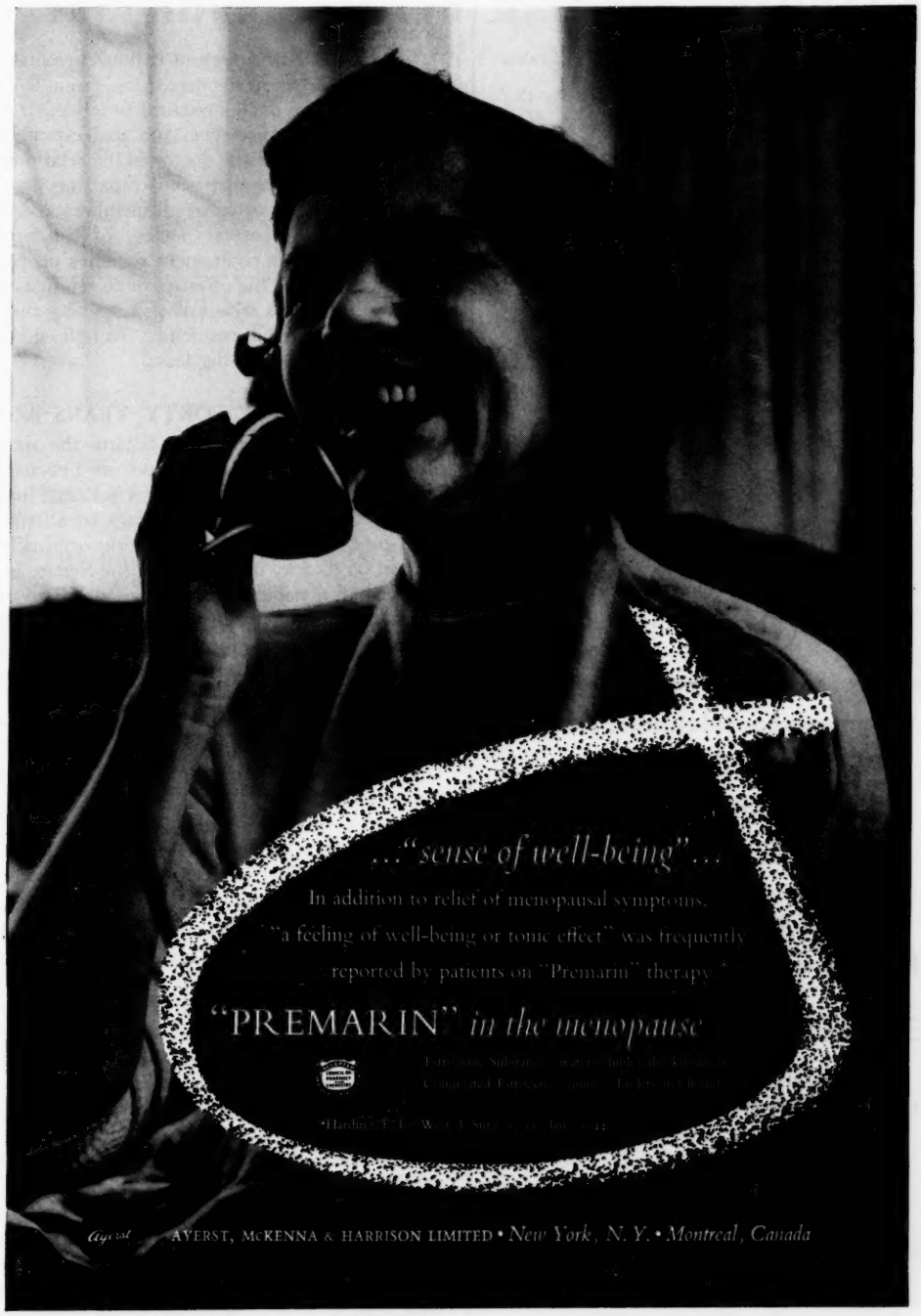
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THROUGH THE MICROSCOPE

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Commenting on the increased cost of the insurance the chairman of the Insurance and Defense Board stated:

"The price we pay for our malpractice insurance represents the cost of departure from the high character of the *art* of medical practice. It is the honesty, heart, conscience, and understanding, in short, the *caliber* of the doctor in his relations with each of his patients that needs repairing. . . . It is time we make it known to all members and to the public that the Medical Society of the State of New York and its component societies propose no longer to condone the offenses or to retain as members the offenders who are endangering the good name of organized medicine. Enlightened self-interest demands nothing less."

IT WAS ONLY FORTY YEARS AGO

The Income Tax proposal became the sixteenth amendment to the Constitution on February 25, 1913. Today, forty years later, we find that this tax accounts for about four-fifths of all the governmental receipts. The legislation originally was started on its way in 1908 when the Senate became engaged in a debate on a proposed bill to reduce tariffs and add an estate tax When the proponents of the idea of a tax found the going rough in the Senate they decided upon a Constitutional Amendment. Their opponents did not fight this too hard, apparently thinking the various state legislatures would not approve. But within four years, Delaware became the 36th state to approve the amendment, and thus was the tax born.

PUBLIC HEALTH PHYSICIANS CONSIDER ORGANIZING

Under the auspices of the American Medical Association physicians engaged in full-time public health activities were to meet in New York this month to consider organizing as the American Association of Public Health Physicians. The new organization has the endorsement of the AMA board of trustees, and Dr. Bruce Underwood of Louisville is the chairman of the organizing committee. Aims and objectives of the new group are cited as 1) a greater degree of leadership at the national level by physicians in public health work, 2) the promotion of legislation and influencing public opinion at the national level in the presentation of the aims and objectives of the Department of Health at all levels of government, 3) better relationships with other national groups, 4) improved practices in the field of public health administration from the viewpoint of the public health physician, 5) service as a liaison group between the AMA and the American Public Health Association.